COAL AGE

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The Pitboss

By Berton Braley

Written expressly for Coal Age

I

The Pitboss is a mighty man
  Wherever coal is found,
He's chief of all the grimy crew
  That burrows underground,
His fist is hard, his voice is loud,
  Men tremble at the sound.

II

He's learned his job through years of toil,
  And learned it through and through,
And he's the Big Smoke underground
  Because of all he knew
Of mining coal and handling men
  (And pleasing owners, too.)

III

He knows each miner by his name
  —The Hun, the Finn, the Russ,
He knows which ones to coax and soothe
  And which to drive and cuss,
And how to fight like sin itself
  If some one starts a fuss.

IV

He knows each entry, hoist and seam,
  Each foot of slope and track,
And why one miner gets clean coal,
  Another only slack,
And, blindfold, he could lead you through
  The mine—and lead you back.

V

The "Shirkers" hate him like a snake
  That's trampled in his hole,
And some men say he has no heart
  And some, he has no soul,
But all admit he's on the job
  And getting out the coal.

VI

Yet though he drives and though he swears
  And loves to fight, pell mell,
If danger overtakes his men
  He'll go through blazing hell,
To save their lives he'll battle fate
  And risk his life as well!

VII

So take the Pitboss all in all
  Despite his roughneck way,
We must admit he gets the coal
  And earns his daily pay,
And as a Human Being, well,
  —Let's mark him down, "o.k."!

Electricity in Coal Mining

By George R. Wood*

The past year has recorded steady progress in the application of electrical power to mining operations. Most of the items in the following resume are not developments of a single year, but rather represent the culmination of a period of several years' experiment, improvement and practical use.

In the mining-machine field, there has been a continued trend toward the so called shortwall or side-cutting chain machine. Many weaknesses have been eliminated, the driving power increased and improved, and machines are now obtainable which will cut closely along an irregular and hard bottom, without climbing into softer cutting. Those whose coal is "burned hard to the bottom" will appreciate this.

Large numbers of gas-proof machines have been put into service, which are accepted by the various state mining departments for use in gaseous mines, and the necessary gas-proof junction boxes and switches are also obtainable.

Several special machines have been designed for cutting in the middle or top of the seam, whereby streaks of bone or impurities may be cut out and thrown back before shooting. Anthracite coal is now being successfully undercut, which alone indicates the advance in strength and power of chain machines within a very few years.

In electrical haulage a number of improvements attest the necessities of the operator and the ingenuity and resourcefulness of the manufacturers. The largest standard locomotives are now being operated in pairs, from one controller, forming the largest haulage unit yet designed. The use of ball bearings for motor armatures has extended from the smaller to the larger motors, eliminating bearing and pole-rubbing troubles, while a waste-packed, bronze-bushed bearing is also giving good service.

For heavy main-line service as above, one thousand amperes and more is often required, which is beyond the limit for the ordinary mine-trolley wheel. A new harp and wheel now offered has a bronze axle solid in the wheel, running in a waste-packed steel bushing, with heavy bronze contact springs to take the current from wheel to harp. In Pennsylvania and some other states, pillar work requires the use of locked safety lamps, which therefore bars out trolley wires.

The operators have been impatiently awaiting development of a satisfactory storage-battery locomotive for use in gathering from pillar work and from room headings on the same air current. Such locomotives are now offered, and the coming year will doubtless see these widely installed and further developed.

A combination locomotive has been designed to run either on trolley or on battery having a motor with double winding on the armature, with two commutators. One winding operates at trolley voltage, to drive the locomotive. The other winding, while running on trolley, generates current at proper voltage to charge the battery, and when off trolley, acts as a motor to drive the locomotive from the battery. This type will find application where the locomotive operates both on room and cross headings.

In case operation on trolley is not of sufficient duration to fully charge batteries, the armature shaft may be disconnected and run at full speed while the locomotive is standing, waiting for empties, etc.

Where the service is severe, and a straight storage-battery type would not be practicable for an eight- to ten-hour shift without recharging, a type has been designed with removable battery tray, whereby at the noon hour, for example, the tray may be rolled out onto a platform and a charged battery substituted, thus keeping the battery size and weight within reasonable limits.

In addition to the special requirements in gaseous mines, which primarily demand this development, the storage-battery locomotive will find almost unlimited application in general mining work, not only because of the saving in trolley construction and bonding, but in power cost, as it will be charged at night, and take haulage load off the day peak.

Several important installations of electrical shaft hoists and slope haulages have been completed during the past year. The use of Wuest herringbone gears is a marked improvement over the spur type, and removes a chief objection to the straight alternating-current system, as compared with the Ilgner and Ward-Leonard systems. The increasing use of central-station power from large-capacity systems has worked against the Ilgner flywheel system, but the ease and certainty of Ward-Leonard control has influenced most of the large shaft installations.

The use of Wuest gears has also extended to large mine pumps, with marked reduction in noise and vibration, also in cost of motor repairs, as the vibration with ordinary gears tends to crystallize armature copper.

The increasing use of purchased power will have far-reaching effects in reducing mine costs, because any deterioration, in almost any department, is brought forcibly to the attention of the mine management through the power bill.

The use of portable wattmeters, dynamometers, bond testers, volt- and ammeters will demonstrate plainly where large economies may be effected in haulage, pumping, ventilation and mining. All of which sounds rather formidable to the old-style mine foreman or superintendent, but plainly demonstrates that modern electrical mining requires the supervision of a competent and alert electrical mining engineer.

*Electrical engineer, Phila., Penn.

IDEAS AND SUGGESTIONS

Some Points for Mine Officials to Consider

Do you, Messrs. Manager, Superintendent and Auditor of coal concerns, know all you should about the details of actual mining operations of your company? Have you looked into every phase of affairs, including storekeeping, shipping, commissary operations, etc., until you are reasonably sure everything is all right?

How many officials can step forward and say "Yes," in answer to these questions? The issues involved, even in small concerns, are so great that few conscientious coal men can sincerely say that they *know* everything is O.K. Constant vigilance is necessary all along the line if loss in some form is to be avoided.

But there are managers, superintendents and auditors whose actions imply the folly of directing such questions to them. They take it for granted that things are all right because they seem to be running in the groove set for them. It is easy to visit coal-mining plants, time offices, storehouses, commissaries, etc., and after observing things going along smoothly, to make ourselves believe that everything is all right. But is it?

You'll never know until you get under the skin of affairs and dig into the actual operation of things. This takes time and is too often the reason why the real inside of conditions is not uncovered.

The Time Office

Take the time office where timekeepers record the earnings of your men and where most all of the employees go at one time or another to draw checks, inquire about time, get their pay, etc. Do you drop in once in a while and ask how things are? You will be told they are all right. But you don't know, do you?

Now, there are lots of matters your time office handles that you ought to know all about. It is the very heart of your operations, and the money you pay out for earnings recorded there is the life blood of your concern. Your payroll is probably the largest single item of expenditure. At a coal-mine time office, regardless of the honesty of your timekeeper and regardless of how long he has served you honestly, a rigid enforcement of the following practices should be observed:

As time for men working underground is the big item, you should have a check on it. Install the right kind of gate house at your mine entrance and record there the time men enter and come out. Use this record as the base of payment. Check against this the time reported by your inside foremen each day. By this plan you will quit paying full shifts to men who work only three-quarters or less.

Be sure your timekeeper has approved rate sheets to rate his roll from. These sheets should always show the maximum rate to be allowed for certain occupations, as mechanics, etc.

Don't let the timekeeper who makes up your roll pay it off as well. If you do, it is a cinch for him to run in "straw men;" for he can put them on the roll and gate book too before payday.

Stay long enough in your time office to see if the men are treated right. A discourteous timekeeper can do more to aggravate labor than any other man on the job, and the worst of it is he gets by with it because as a rule there's no one to hear him but the men he talks to. In this day of "Safety First" and welfare work, the best place to begin with welfare is the average time office.

Have You a Check on Pick Work and Machine Mining

Getting back to the mine itself. Do you know that your company men actually work a full shift? If some of your miners are on pick work and some loading behind machines, do you know that no machine coal is run out on pick numbers? The answer is that you pay a higher price for pick coal and if you don't know it, you'd better. You can know this by having your machine foreman make a daily report showing names and check numbers of men loading behind machines, and the mine boss can check the machine foreman once in a while, too. Do you know whether you pay your machine runners for more tonnage than they cut? It's mighty easy to do this. The right kind of report from the machine boss will keep this right.

Does your weighman use care in weighing the coal on the tipple and does he, too, act with courtesy and fairness to the men? He, like the timekeeper, can do a lot of harm if he isn't the right kind.

Let's visit your storehouse. Is your company one of those charging all supplies carried in stock to an inventory account and charging the mine with the actual quantity used each month? Then, what does your inventory or stores account amount to? Do you know how much dead or obsolete stock you are carrying? Do you have any kind of classified arrangement that enables you to study each class of your stock so as to intelligently determine whether you are carrying a supply sufficient for one month or for twenty?

Is your storekeeper a man who will issue anything he has in any quantity if he gets a requisition for it? Or is he the kind of storekeeper who knows enough about the workings of the plant to be a competent judge and then exercise that judgment? If he is the latter kind and cuts a requisition for six commutator-end bearings to four because he knows that is enough, do you, Mr. Superintendent, back him up, or do you listen more agreeably to the "howl" your electrician makes because he couldn't get two extra bearings to stick away somewhere to be lost or stolen?

A good storekeeper should work, first of all, for the company; that is, he should run the store as if he owned it; the superintendent should make him feel that when he saves the issue of unnecessary material and thus saves money for the concern, he is doing right.

Keeping Track of Repair Material and Labor Charges

Have the names of men who are authorized to sign requisitions posted in your storehouse. Confine it to as few foremen as possible, and make your storekeeper live up to it. A good way to keep track of repair material is to number each pump, locomotive, mine machine, etc., and show on each requisition the number of the machine the material is for. At the end of the month you can see what each piece of machinery has cost in the way of repair material, and the labor can be kept track of in the same way by showing the same data as to number of machine on the labor abstracts and time books.

Do you run a commissary in connection with your operations? In too many cases the easiest thing for a commissary to do is to make too much profit. Guard against this because the best interests of your company and your men will be served by operating the commissary as an aid to operations in affording clean, wholesome food and the commodities of life to your employees at a fair price. Do not run it simply as a money maker. You should make your profit from the sale of your product.

Know all you can about your operations, and realize that even then you cannot know it all. Real study and consistent attention to various details will open your eyes from time to time. Don't stay in the position of being satisfied that everything is all right. Keep looking for things that are wrong. You will be sure to find them. In finding and correcting them, you will almost certainly save your company real money. It takes a lot of honest effort and hard work to get out of the "satisfied rut;" however, it is work that will pay any mine official to tackle.

Analyzing the Mine Cost Sheet

By J. B. de Hart*

Have you ever considered the relation of your total cost of mining to the small items of which it is composed? Take another look at your cost sheet. Is it not composed of a large number of small charges which, when added together, make quite a respectable total? Each item by itself is almost negligible, but the total is appalling.

It is similar somewhat to an integration. It is a well known fact in mathematics that an infinite number of infinitely small things make a concrete whole. In coal mining, it often happens that we have, not an infinite number of infinitely small things, but a large number of comparatively small items. In order to come to a proper understanding of how the total is constituted, it is necessary to analyze the system. Since each item is small, none can be reduced to a great extent. Practically, then, the problem before us is to make as many reductions as possible though each one in itself may appear negligible. You will find that the summation of a fair number of very small savings gives a gratifying reduction in the total cost per ton.

It is clear that by increasing the output from the mine you will get a smaller cost per ton for every item of expenditure which is independent of the tonnage. In other words, your "fixed charges," expressed in dollars per ton, are inversely proportional to the tonnage. Although the production of a larger tonnage will mean an additional expenditure for one or more items, nevertheless, owing to the reduction of the fixed charges per ton, the total cost per ton may be reduced.

*Coleman, Alberta, Canada.

Assuming an Actual Case

Take a concrete example. Is your mine a wet one? Do several places remain idle every day because of water? Then figure out if an extra pump or pumpman would not pay you. Suppose your output is 1000 tons per day and your total cost of mining $2 per ton, made up of, say fixed charges, 20c. per ton; pumping, 5c. per ton; mining charges, etc., $1.75 per ton. Now employ another pumpman at, say $3 per day and suppose that this enables you, by keeping your places dry, to increase your output by 20 tons a day. Your fixed charges are now $\frac{1000}{1020} \times 0.20 = \$0.1961$ per ton. Your mining cost, etc., should still be $1.75 per ton, and your pumping cost will now be $\frac{(0.05 \times 1000) + 3.00}{1020} = \frac{53.00}{1020} = \$0.0519$ per ton. The total cost per ton is now $0.1961 + $1.7500 + $0.0519 = $1.9980 per ton.

Nor is this the only instance in your mine where an apparent expenditure is a real saving. Have you animal haulage in your mine? Have you bad tracks in places? Don't figure on the cost of maintaining a good haulage road necessary to keep the cars on the tracks; but rather figure on the reduction of output caused by one car being derailed. Perhaps, that derailed car means five drivers blocked and waiting, unable to get their loads to the shaft bottom or to the parting. Perhaps, each of these drivers loses one trip that day. The result is a decided loss of output for the mine. Would it not pay to have the track fixed, or the roads graded even if the risk of injury to drivers and animals be alone considered.

Employ an Extra Timberman

Suppose, again, a thick, pitching seam where the output per miner is high, say 10 tons. Two or three men going home each day for lack of timber means a loss of output of 20 or 30 tons. Would it not pay you to employ an extra timberman to avoid this trouble and loss, to say nothing of a possible fatal accident.

You say that your underground officials are paid to look after these details. True; but has your mine foreman never come to you, perhaps just after you have been looking over a particularly exasperating cost sheet, and asked permission to grade a certain road or to put on extra shiftmen? And what did you tell him? "We can't stand the expense just now." He is paid to look after the work and the men; but it is *you* who must give him the authority to have the work done. Give your foremen credit for trying to reduce the cost. When they make suggestions, look into the matter carefully; figure on the proposition, and see if the suggested change or improvement would not result in an ultimate saving. If your foreman is wrong, show him where he is wrong; but if he is right, give him credit for the suggestions. You will find your officials will take more interest in the work, things will run smoother, and, *mirabile dictu* the "impossible" has happened, your cost has come down.

When testing for gas with a safety lamp, remember that (1) The height of the cap depends not only on the amount of gas present, but also upon the size of the testing flame. (2) That a 1½ to 2 per cent. mixture produces a very small and scarcely visible cap, with a testing flame having a small white apex. (3) That density is a better indication of percentage than height.

The Electrical Equipment of a Modern Mine

By W. R. Jones*

SYNOPSIS—A modern equipment has been installed at the mine of the Carnegie Coal Co., at Charleroi, Penn. Two electrical locomotives weighing 30 tons apiece, trawling on an 85-lb. rail, each hauls 72 five-ton coal cars up a 2 per cent. grade. These are supplemented by 12 six-ton crab locomotives for gathering purposes.

The electrical equipment of the recently opened mine of the Carnegie Coal Co., at Charleroi, Penn., is modern in every respect.

Steel Tipple at Charleroi Mine of the Carnegie Coal Co.

This mine was originally owned by the Pittsburgh Plate Glass Co., but its operation was suspended after the tipple was destroyed by fire two and one-half years ago. The Carnegie Coal Co., needing considerable increase in production, purchased it in February, 1913, and proceeded to re-equip it throughout.

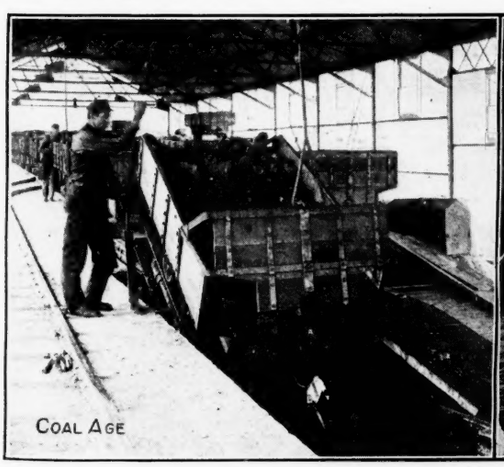
Heavy Grade Handicap Removed

The first step was to rearrange the main haulage so as as make possible more economical operation. Previously, the coal was hauled to the drift mouth from the inside partings by electric locomotives over a road having a maximum grade against the load of 3½ per cent. The cars were then hauled 2500 ft. to the tipple by an endless rope, 1000 ft. of this distance having a grade of 17 per cent. in favor of the load.

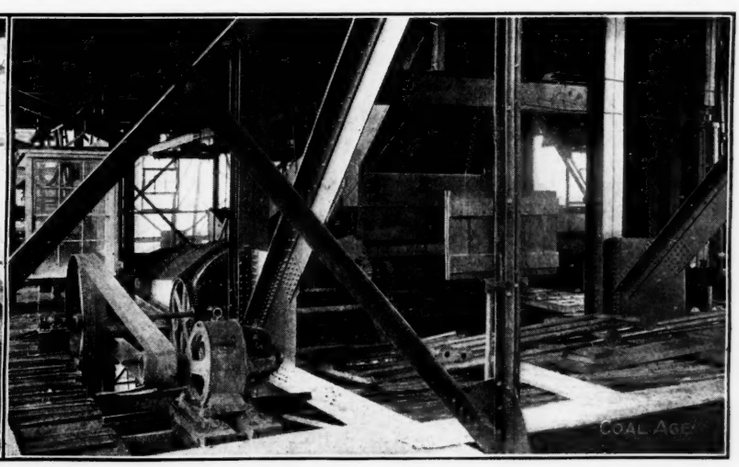
The present main haulage leaves the old main entries at a point about 3000 ft. from the old drift mouth, passes through a rock tunnel 820 ft. long, and continues outside 1500 ft. to the tipple. The maximum grades are 2 per cent. against the load and 2.6 per cent. in its favor. It was necessary to build a Hy-Rib concrete culvert 6 ft. in diameter and 250 ft. long, in order to cross a stream and to make a fill of 18,000 cu.yd. at the approach of the trestle. It is evident, therefore, that the Carnegie company proposed to spare no expense in securing efficient operation.

Electric power is used throughout the mine and is purchased from the Duquesne Light Co., of Allegheny County. This company is at present supplying direct-current power from a Westinghouse portable 500-kw. substation, which receives alternating current at 22,000 volts and delivers direct current at 550 volts. A perman-

*Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn.



Dumping a Car in Tipple



Shows Motor Driving a Rotary Screen

ent substation, to contain three 500-kw. Westinghouse rotary converters, is being built by the Duquesne Light Co. By this arrangement the mine avoids an investment of about $60,000, secures highly reliable power, and is entirely relieved of all power-house troubles.

A Modern, Fireproof, Large-Capacity Tipple

The tipple and trestle are excellent examples of modern construction. They are built entirely of steel with concrete floors. The total length is 629 ft., width 44 ft., and height to tracks, 57 ft. The tipple consists in reality of two complete systems, having two loaded tracks equipped with trip pullers, two Dempcy-Degener automatic car stops, two Phillips crossover dumps and two empty up-hauls, which also form the cars into trips. There are also two separate screening equipments and two loading booms.

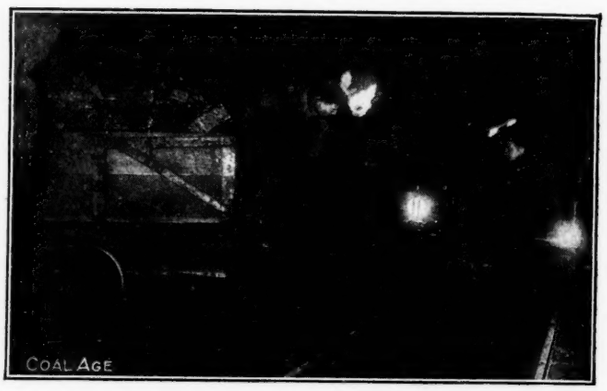
The motors for driving the tipple equipment are as follows: Two 30-hp. for driving the chain hauls; two 15-hp. for the revolving screens and one 7½-hp. for the two loading booms. The dumps are operated by compressed air furnished by two 50-cu.ft. motor-driven Westinghouse traction-brake air compressors. A three-drum Meade-Morrison hoist driven by a 40-hp. motor, is used for hoisting supplies to the tipple and hauling empty railroad cars. All these motors are of Westinghouse make.

The mine pumps are driven by self-starting motors, there being in all ten 10-hp. and five 5-hp. Westinghouse motors. These motors can be started by one man from a switch at a parting and each motor can be started by simply throwing in a line switch. The coal-cutting equipment consists of 10 Jeffrey breast coal cutters and 10 Sullivan continuous-cutting machines.

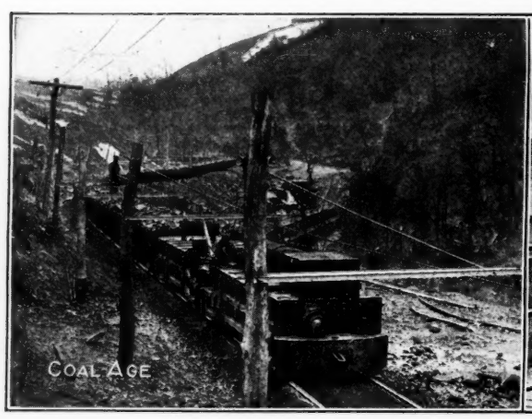
The Largest Locomotives on the Heaviest Rail in Mining Work

The locomotives were especially selected to permit a high daily output. As is generally known, this mine has two of the largest mine locomotives ever built. They weigh 30 tons each and are of the Baldwin-Westinghouse bar-steel type. Each locomotive consists of two 15-ton units so that the weight is distributed over eight wheels and great tractive power is secured. The two units are controlled as one from the controller of the leading unit and by a system of air brakes. When the units are uncoupled, they form two 15-ton locomotives, each with its own controller and brakes.

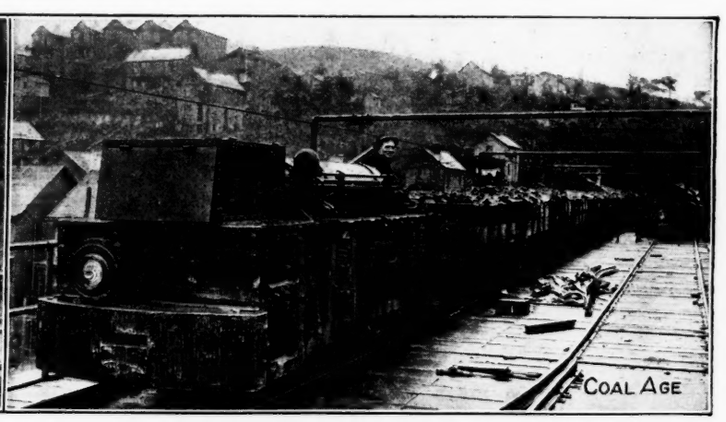
An illustration shows one of these 30-ton motors hauling 72 loaded cars. As each car weighs about 5 tons loaded, the total load is about 360 tons and the draw-bar pull on the 2 per cent. grade is about 23,400 lb. The locomotives do the work with perfect ease and are evidently able to handle heavier loads, although their limit has not yet been ascertained. For the main haulage 85-lb. rails are used, which give a high-percentage adhesion.



Gathering Locomotive Hauling Loaded Car from Room by Means of a Steel Cable



30-Ton Locomotive Hauling 72 Cars Weighing 9800 Lb. Gross Each



15-Ton Locomotive (One Unit of the 30-Ton Locomotive) Hauling Cars onto Tipple

Twelve 6-ton Westinghouse bar-steel locomotives, of the traction-reel or "crab" type, are used for gathering. Each locomotive carries a long steel cable, which is wound on a reel by an independent motor and draws the car out from the face. With these locomotives it is unnecessary to lay heavy rails or install trolley wires in the rooms.

A 5-hp. motor drives the machinery in the blacksmith shop, and a 10-hp. motor furnishes power in the machine shop for driving a planer, lathe, drill press, grinders and saw.

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Sweden, Finland, Denmark, Germany, Holland, Austria and Russia depend for a large part of their fuel supply upon air-dried peat bricks. Russia is the largest peat producer in the world. In 1910, 5,000,000 tons of peat were produced; since then there has been a yearly increase in production of about 300,000 tons. Many Russian cotton mills have their own peat plants which yield as much as 200,000 tons per year.

Some Notes on Mine Lighting

By R. S. Iremonger*

SYNOPSIS—The advent of better lighting in the steel plants was made in the face of bitter criticism and general ridicule but, has now been developed to an unusually high standard. Much the same opposition is being encountered in the coal industry and, no doubt, the ultimate results will also be similar. Illuminating engineers are now studying the mine-lighting problem.

Within the past few years there has been an evolution in artificial illuminants, and this has affected their use to a far greater extent than the average person is aware. In industrial plants good lighting is no longer looked upon as an expensive luxury, but is considered as a tool, absolutely essential to economical production and the prevention of accidents. Today there are comparatively few mills or factories of any size that have not completely remodeled their lighting installation to conform to the new standards, and statistics are cited which eliminate any doubt of the effectiveness of good lighting in increasing production, reducing spoilage and minimizing the number of accidents.

Lack of Knowledge Regarding Mine Lighting

There is probably no branch of industrial lighting which has received so little consideration at the hands of the illuminating engineer as the lighting of mines. Mine foremen and superintendents will claim that little or no light is required, just as the officials of the steel mills a few years ago ridiculed the possibility of a relatively high standard of illumination ever being considered a necessity in their work. Careful investigation and tests of actual installations, however, quickly reveal the advantages to be gained and today the large steel mills in the vicinity of Pittsburgh and elsewhere are notable examples of excellent industrial lighting.

Recent improvements in the tungsten-filament incandescent lamp, by which that hitherto somewhat fragile light source has now been made sufficiently strong and rugged to withstand the ordinary shocks and vibration incident to rough service, and the development of a high-voltage lamp of this type has made it available for mine lighting.

The following account of the results thus far attained in an investigation being carried on by myself and others, indicates that the time is now ripe for the serious consideration of the subject by mining interests. Such consideration cannot fail to produce a realization of the value of good lighting, which will inevitably be followed by a change in practice nearly, if not quite, as revolutionary as that which has taken place in the steel mills.

Investigation of Conditions at an Anthracite Colliery

The majority of mines operate their locomotives, motors and other electrical apparatus on direct current at a nominal voltage of 250, while a few operate at 440 or even 550 volts. The generators are usually over-compound wound to 300 volts at full load. Owing to line losses and poor regulation, the actual voltage at the lamp socket varies widely at different points on the line and fluctuates from time to time. Table No. 1 gives the voltages obtained at the power-house switchboard, at the machine shop (distant 1500 ft.) and in the mine pump room (distant one-half mile) during a recent test at an anthracite mine, located near Scranton, Penn. Approximately the same conditions were found to exist in western Pennsylvania, West Virginia and Kentucky.

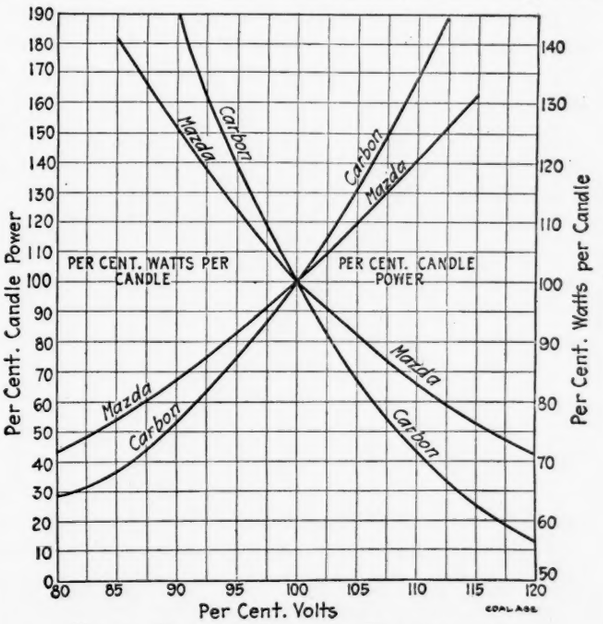


Fig. 1. Diagram Showing Efficiency of Tungsten Filament Lamp

At Power House		At Machine Shop		In Mine Pump Room	
Time a.m.	Volts	Time a.m.	Volts	Time a.m.	Volts
10.25:00	218	10.46:00	260	11.31:00	260
15	210	15	248	15	240
30	208	30	250	30	245
45	240	45	200	45	265
10.26:00	230	10.47:00	156	11.32:00	280
15	230	15	200	15	285
30	150	30	260	30	272
45	210	45	240	45	275
10.27:00	211	10.48:00	240	11.33:00	280
15	227	15	240	15	225
30	240	30	210	30	245
45	270	45	270	45	288
10.28:00	206	10.49:00	240	11.34:00	240
15	201			15	260
30	268			30	245
45	260			45	262
10.29:00	265			11.35:00	265
15	290			15	260
30	285			30	275
45	275			45	265
10.30:00	260			11.36:00	240
15	275			15	220
30	270			30	250
45	274			45	235
10.31:00	270			11.37:00	260
15	290			15	255
30	280			30	215
45	275			45	238
10.32:00	270			11.38:00	175
15	280			15	230
30	270			30	180
45	275			45	200
10.33:00	290			11.39:00	290

Under conditions of varying and fluctuating voltage, the tungsten-filament incandescent lamp has one quality which alone gives it preference over the carbon. Owing to its characteristic positive temperature coefficient, at voltages so low that a carbon lamp is practically extinguished, a tungsten filament lamp of the same rated voltage will still emit a relatively high percentage of its nor-

*Edison Lamp Works, General Electric Co., Harrison, N. J.

mal candlepower (see Fig. 1). It is, therefore, customary to select a lamp of the highest rated voltage at which, when operated at the minimum voltage of the circuit, sufficient light will be emitted for the particular process to be performed. To meet this condition, the tungsten-filament lamp has been developed in a range of voltages especially adapted to mine lighting.

Adequate Light as an Accident Preventative

"Safety First" is fast becoming a universal slogan in all industries. Ignoring the humanitarian phase of the subject, recently enacted laws have made accidents an expensive luxury and but little study of the question is necessary to make it apparent that it is more economical to take advantage of every reasonable method of preventing accidents than to pay the damages to persons and property and suffer the delay in production resulting from neglect. Light of sufficient intensity and proper quality to permit quick, clear and accurate vision is one of the most efficient safeguards and, correctly used, will go far toward the minimizing of preventable accidents in mines, as it has in other branches of industry.

It is not, of course, either necessary or practicable to illuminate a mine tunnel throughout its length at a high intensity. Therefore, a method similar to that employed in suburban streets and roads has been evolved. The walls of the passageways at curves, crossovers and junctions and at intervals of from 500 to 750 ft. on straight track are coated with a band of whitewash 15 to 20 ft. wide, and a tungsten-filament lamp, with proper reflector to reduce glare and direct the light where required, is so installed as to illuminate this whitewashed area at a relatively high intensity. Thus persons in the passageway or objects on the tracks may readily be distinguished at long distances by silhouetting against the brightly illuminated white background and signals are easily seen by the motorman, who is thus enabled to operate his trip at higher speed and with a greater degree of safety.

Some General Notes and Costs

Experience has shown that in every mine certain points are more dangerous than others. Illumination of these points by this method will tend to minimize accidents.

Increasing the intensity and properly locating suitable lighting units at the foot of mine shafts, in pump rooms, machine shops, mule barns, emergency hospitals and such other places located underground as require good lighting, will enable oilers, spraggers, machinists, veterinarians, blacksmiths and others to work more efficiently and safely.

The necessary whitewashing, if done by the spraying method, is not prohibitively expensive, and should be renewed from time to time as required.

The cost of lighting may be subdivided into two general factors: the price of current and the cost of lamp renewals. It is conceivable that, at very low rates for power and free renewals of carbon lamps, it might be cheaper to use carbon than the tungsten-filament lamps. An accurate record was kept during the tests at the Scranton mine and it was found that, aside from the advantages of better lighting, the Mazda tungsten-filament lamp for mine lighting gave nearly three times the useful life of the carbon; not one lamp was stolen or maliciously broken, and the cost of good lighting was relatively small as compared to the insufficient and unsatisfactory lighting with the carbon lamps.

I am collecting further information on the subject and hope in the near future to be able to contribute an illustrated article covering definite cost data, etc., on many actual installations.

A Mammoth Central-Power Plant

By Frank H. Kneeland

SYNOPSIS—Describes a plant of 37,500 kw. generating capacity that will efficiently produce a commercially valuable electric current from a cheap or almost worthless fuel.

What is believed to be the largest central-power plant located in any coal field in the United States is now being constructed by the Lehigh Navigation Electric Co., at Hauto, Penn.

As is well known, the fine sizes of anthracite, such as buckwheat No. 3 and smaller, although containing a high heat content, possess but little present value at the mines. The fundamental idea in building this power plant at Hauto is to convert this low-priced and, from the momentary standpoint, comparatively worthless fuel into commercially valuable electric current.

A considerable proportion of the fuel mined in the country today is used in the generation of electricity. Particularly during the past few years the idea has been gaining force that it is cheaper to manufacture power at the mine and transmit it to the point of application than it is to ship the coal over an equal distance and there convert it into electric energy in a small and isolated plant.

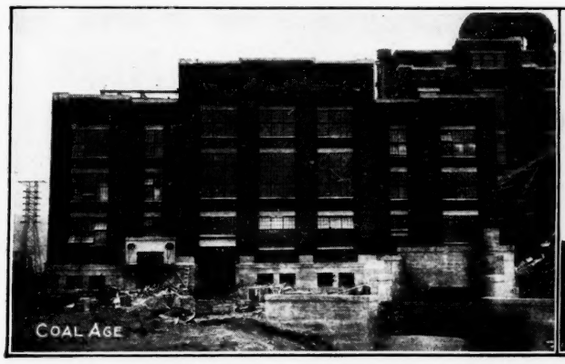
The power plant at Hauto will for the present supply current to neighboring coal mines and local industries. It is the intention, however, later on to increase the size of the plant, and extend the transmission lines for a considerable distance.

The overall dimensions of the present plant, which is a permanent brick structure, are 416x195 ft. It is divided into two main parts, namely, the boiler room and engine room, the inside dimensions of which are 68x285 ft., and 193x130 ft., respectively. There are at present eight boiler units, each of 1000 rated horsepower, installed in the boiler room. These are set singly and occupy floor space of 25x25 ft. They are of the Maxim water-tube type, provided with superheaters, and are fired from each side.

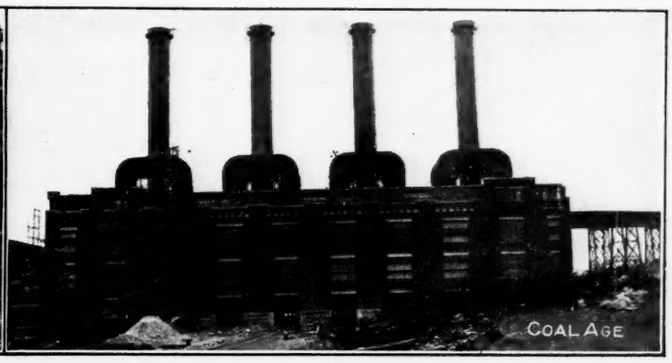
The smoke-stacks, which are at present four in number, are 12 ft. in inside diameter, and extend 89 ft. above their juncture with the breechings. The top of each stack is 140 ft. above the grate bars.

One of the unique features of the plant is the fact that the ashes from the furnaces can be discharged direct into air-dump ash cars, of standard gage, run into the building below the boiler-room floor. The expense of ash disposal is thus greatly reduced.

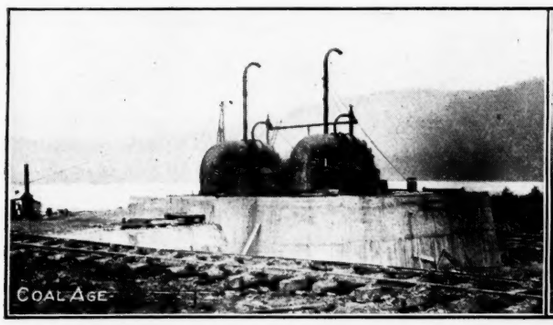
In the engine room there are at present installed three General Electric Curtis horizontal steam turbines, operat-



NEAR VIEW OF ENGINE HOUSE PROPER



THE BOILER HOUSE AND COAL-SUPPLY TRESTLE



THE CONDENSER CIRCULATING PUMPS DURING ERECTION

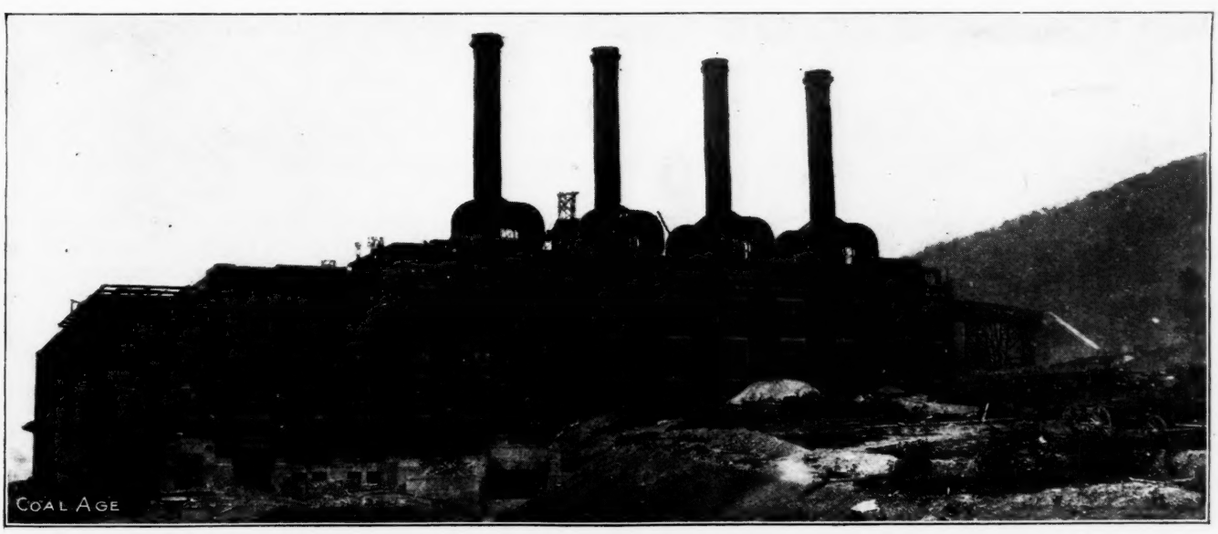
VIEW ACROSS DAM FOR IMPOUNDING CONDENSER WATER

ing at 1500 r.p.m., and direct connected to generators of 12,500 kw. capacity each. Current is produced at 11,000 volts, and 25 cycles. This is stepped up to 110,000 volts before going to the transmission lines.

Excitation of the generators is accomplished by General Electric turbine-driven exciters of 300 kw. capacity each. Each generator is also equipped with a suitable condenser and condenser pump. These are of the Westinghouse-Le Blanc type.

In order to secure a suitable supply of condensing water, a dam 1500 ft. long with a maximum height of 31 ft. has been built across Nesquehoning Creek, upon the bank of which the power plant is built. It is estimated that this dam will impound a lake or pond containing 1,100,000,000 gal. of water.

This lake is shallow and covers a large acreage, thus presenting an immense cooling surface. In order to take advantage of this to the utmost extent, the circulating water for the condensers is taken from the pond in the vicinity of the dam and almost directly in rear of the power plant, and after passing through the condensers, is discharged into a sluice which conveys it to a point about one-half mile above the dam, and there discharges it into the lake.



GENERAL VIEW OF THE ENTIRE BUILDING, SHOWING COAL TRESTLE AND SLUICE FOR CIRCULATING WATER

In times of drouth, therefore, when there is practically no addition to the water in the lake, its contents are put through a continuous cycle passing from the lake to the condensers, then back again. The immense volume and surface of the impounded area are, however, sufficient to answer for all cooling purposes.

As has been stated above, the present generating capacity of the equipment is 37,500 kw. Everything about the plant, however, has been built with the intention of increasing its size to an ultimate capacity of 100,000 kw.

The intention is for the present to transmit power within a radius of 50 miles to various collieries in the anthracite region, the Lehigh Coal & Navigation Co. being the largest consumer. Eventually, however, it is the intention to extend the transmission lines to furnish energy over a radius of 200 miles. It is believed that the city of Philadelphia will, at no remote date, become the principal market for power generated in this plant and the future additions thereto.

The approximate gross cost of the power plant, substations and transmission lines is estimated at $3,000,000. The engineering work has been carried on by L. B. Stillwell, of 100 Broadway, New York City, with A. G. Sidman, resident engineer in charge of construction.

Storage Batteries for Mine Locomotives

By William Van C. Brandt*

SYNOPSIS—This article describes a lead storage battery, of which the positive plate consists of molded rubber tubes filled with peroxide of lead and slit horizontally so as to expose the electro-positive element to the action of the electrolyte. The negative plate is a grid casting of an antimony-lead alloy, consisting of a series of vertical ribs connected by short horizontal bars. The battery has been extensively used for vehicles and street cars and its use for central-station purposes, under a slightly different form, is still older.

At the recent mining show, held in Philadelphia under the auspices of the American Mining Congress, interest was shown in the Electric Storage Battery Co.'s exhibit of the "Ironclad-Exide" battery for mine locomotives.

This battery, of the lead storage-battery type, possesses many interesting characteristics, which make it especially adaptable for this class of work.

During the past few years there has been an increasing interest shown in the subject of storage-battery locomotives for mine and industrial haulage service, and where mine companies have been skeptical in the past of the ability of locomotives of this kind to give satisfactory service, and have been slow to give them a trial, they are now awakening to the fact that they furnish a most efficient and reliable form of locomotion.

The battery locomotive has been found particularly adapted for use in gathering work in mines; it eliminates the necessity for overhead trolley wires, while the fittings for bonding the rails, which are necessary with the trolley locomotive are not needed when batteries are used.

Battery Power Has Replaced Horses

That storage-battery locomotives are suitable for replacing mules in this service is made evident by the fact that storage-battery street cars have taken the place of horses. That these cars are a success has been well proven in New York City. Early in 1910, the Third Ave. Ry. Co. made a test of a few cars operated with various makes of batteries. The results of these tests have been that at the present time this company is operating 137 storage-battery cars. They are all equipped with "Hycap-Exide" batteries. The New York Ry. Co., following the example of the Third Ave. Ry. Co., has also adopted storage-battery cars for some of its lines, and has recently placed orders for 45 cars, all of which are being equipped with the same batteries as used by the Third Ave. Ry. Co.

In considering the question of battery locomotives, the battery to be used is a very important matter and should only be selected after careful consideration. The battery is the very life of the locomotive and the success or failure of the traction unit depends to a great extent on its efficient working.

The Electric Storage Battery Co. has made an extensive study of mine and industrial locomotive requirements, and from its experiences recommended the "Ironclad-Exide" battery for these purposes.

This battery, possessing all of the inherent advantages, such as high watt hour-efficiency, high voltage and low internal resistance of the lead cell, has in addition the advantage of higher capacity than the standard lead plate and twice the life.

Positive Plates Consist of Slit Rubber Tubes Filled with Peroxide of Lead

The "Ironclad-Exide" battery differs from the standard flat-plate "Exide" type, mainly in the construction of the positive plate. Instead of a flat metal grid, into which the active material has been pasted, the "Ironclad-Exide" positive plate consists of a series of hard-rubber tubes containing lead peroxide, the active material. These tubes have a great many horizontal slits, which provide access for the electrolyte to the active material, and yet are so fine as to prevent its washing out.

Each tube is provided with two parallel vertical ribs projecting on opposite sides at right angles to the face of the plate. These ribs not only serve to stiffen the tubes, but also act as insulating spacers, taking the place of the ribs on the wood separators used in the "Exide" and the "Hycap-Exide" batteries and allowing the use of plain ungrooved wood veneers. The rubber tubes have a certain amount of elasticity, so that they can expand and contract in accord with the changes in volume of the active material, during charge and discharge.

The cylindrical form of tube is peculiarly well adapted to perform its function since no amount of expansion or contraction will tend to alter its shape, and the internal strains are thus kept uniform. Another advantage is that most of the electrolyte is carried within the confines of the plate itself.

The negative plate used with the "Ironclad-Exide" positive is of standard "Exide" type, although of increased

*The Electric Storage Battery Co., Allegheny Ave. and 19th St., Philadelphia, Penn.

thickness. In fixing upon the proper thickness for the negative the aim has been to provide a plate having approximately the same life as the positive, thus avoiding partial renewals.

THE CONNECTORS ARE OF LOW ELECTRICAL RESISTANCE

The connectors for joining cells of the "Ironclad-Exide" battery are of a new type. Thin strips of copper, lead plated to prevent corrosion, are laid face to face and their ends cast into alloy terminals. The latter form rings, which fit over the pillar of the strap and are burned in place in the same manner as the "Exide" connector. The advantage of this built-up connector is two-fold, the use of copper instead of lead or alloy giving higher conductivity and the laminated structure giving a flexible instead of a rigid connection.

The "Ironclad-Exide" cell accomplishes a result never before practically obtained by any other lead cell, a plate construction that not only prevents the loss of active material but maintains its activity.

Another great advantage of the "Ironclad-Exide" battery is that it retains a great percentage of its efficiency even in excessively low temperatures. In fact, the Crocker Land Expedition selected this battery for the lighting of a house in the North Polar regions. This house will be established as headquarters for the explorers during their three years of explorations of the land around the North Pole. The expedition sailed from New York on July 1 of this year. The battery equipment was selected after careful consideration and the "Ironclad-Exide" battery chosen on account of its light weight, its high efficiency, its ability to deliver its current in low temperatures, and as it is also to be used for "boosting" the wireless outfit, it had to be absolutely dependable, even in most adverse conditions.

The identical qualities which made this battery suited above all other batteries for the Crocker Land Expedition make it the logical battery for mine-locomotive service.

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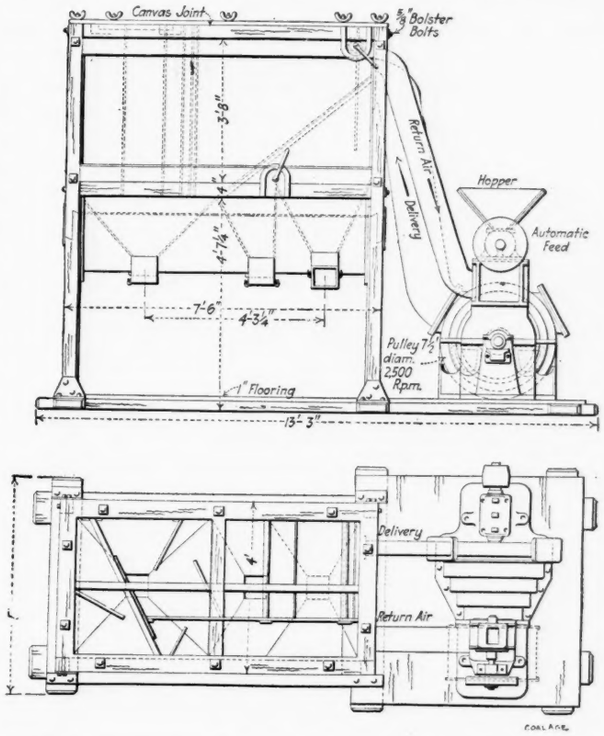
Machine for Producing Stone Dust

In order to produce the large quantities of stone dust needed for use in the coal mines as a protection against mine explosions, a multiple grinder has been constructed by the Hardy Patent Pick Co., of Sheffield, England. The crushing is performed progressively in separate chambers, the whole circumference of which is provided with serrated linings of excessively hard chilled iron. These linings are used as crushing surfaces.

The chambers increase in diameter as they approach the outlet, and the fan action of the large beater draws the air from the smaller chambers and produces a through current from the inlet to the outlet. The materials enter the smallest beating chamber and from thence pass through the others, being subjected to repeated percussive action, increasing in intensity in each successive chamber, the current of air continually carrying away the finished stone dust. It passes through a delivery duct into a storage box from which it can be drawn as required and the air is returned through a suction duct to the grinding machine.

An important point with regard to this apparatus is that in the production of fine powders, the machine is not dependent on grids or screens as is the case with many other grinders, but provision is made for a screen if it is thought desirable to add it. This may be placed at the outlet, but it is not subjected to any beating action, and is only used when it is necessary to prevent any small



A PULVERIZER FOR MAKING STONE DUST TO DISTRIBUTE IN MINE ROADWAYS

pieces of unreduced material from escaping. The leading merits of the machine are a large grinding surface, a freedom from clogging and the production of extremely fine dust.

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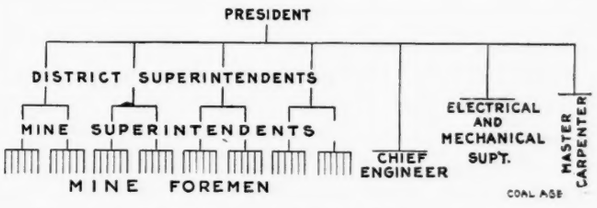
Madison Coal Corporation

In the accompanying sketch we show an outline of the organization of the Madison Coal Corporation in Illinois. The distribution of authority in a large representative company, such as this, together with data as to whom the different officials are responsible, is always interesting. We would like to obtain like data from other companies.



MADISON COAL CORPORATION'S EXECUTIVE FORCE

It will be noted in this instance that the president of the company has four district superintendents reporting directly to him, as well as a chief engineer, the electrical and mechanical superintendent, and the master carpenter. The district superintendents each have two mine superintendents reporting to them, who, in turn, have six mine foremen under them.

The Use of Electricity in Mines

By Clyde G. Brehm*

SYNOPSIS—A few of the simpler problems which confront the mine manager and electrician are here discussed. Direct current only is treated, no reference being made to alternating current or its uses.

The writer in the following article has endeavored to take up in a brief and non-technical way some of the problems that confront the mine manager, mine electrician and others, and their solutions.

The first electrical equipment to engage the attention of the manager at a new mine is the matter of proper signals. Usually the bell in the engine room with the two wires leading out will answer, but it is often desired on a mine haulage to have more than one bell placed at different points in the mine. A diagram of such a system of signals is shown in Fig. 1. For a line of two or three miles in length the main battery should consist of about 25 carbon cylinder cells. The relays should be of the standard pony type as shown and the local batteries should consist of five or six cells.

As shown in the drawing the system consists of three wires, any desired number of stations may be used, placed

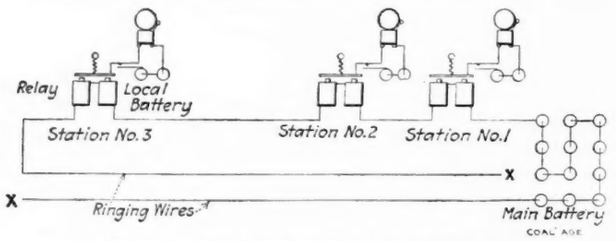


Fig. 1. The Mine-Signal System

in series on the top wire, making connections between the middle and bottom wires at any point will ring all the bells on the system. While the first cost is greater, rubber-covered wire is preferred for this service.

If it is desired the mine telephone can be run along the same route as the signal line, only one extra wire being necessary as any one of the signal wires can be used for this purpose.

One of the best ways of supporting such lines is by using the Weir mine bracket (Fig. 2). This consists of two pieces of galvanized iron 1¼ in. wide by 18 in. long, one end slightly flared out and pointed. The other end is drilled for the bolt holding the wood pins for the insulators. These brackets are put in place by drilling a 1½-in. hole into the coal about 14 in. deep. A wooden wedge is slipped between the points of the bracket which is driven into place. As soon as the wedge hits the bottom of the hole it widens the legs of the bracket and locks them into place. These brackets will accommodate from two to four wires.

Motors for Various Purposes

The manager probably will next turn his attention to the selection of motors for various duties, such as running pumps, fans, breakers, washers, etc. Direct-current motors are classified according to the method of field excitation, as series-wound, shunt-wound and compound-wound. The connection diagrams for all of these are shown in Fig. 3.

A series motor varies in speed in proportion to the amount of current flowing through the armature and field; it will run fast on a light load and slow on a heavy load. It should be used where large starting toque is required, for traction, etc.

In a shunt-wound motor a portion of the current is

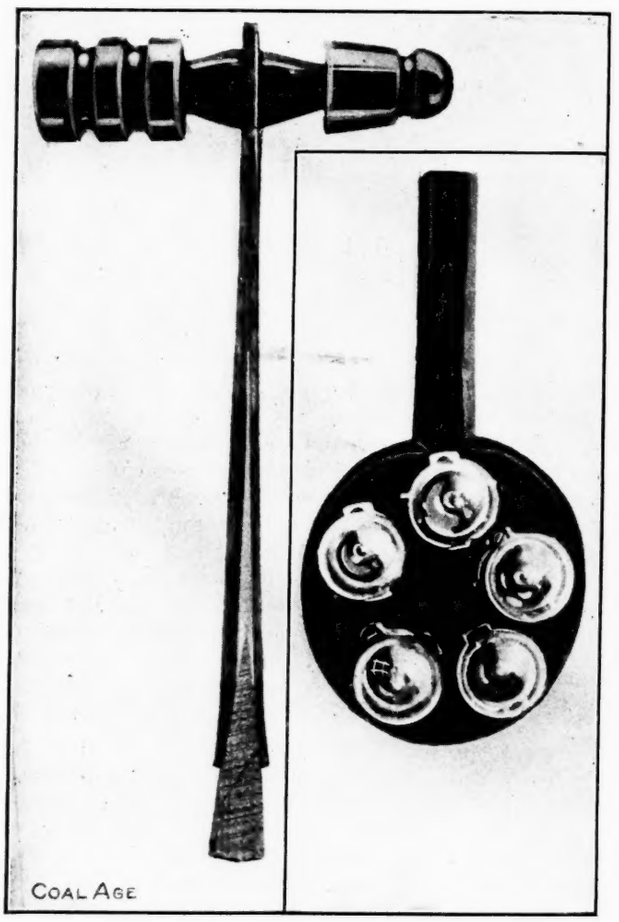


Fig. 2. A Convenient Hanger

Fig. 4. A Handy Test Set

sent through the field which consists of a large number of turns of fine wire. A shunt motor runs at nearly constant speed at all loads.

A compound motor is a combination of the shunt-wound and series-wound machines, having two sets of field windings. They are used at places where the load varies considerably.

When standing facing the commutator end of a motor if the armature revolves in the same direction as the hands of a clock, it is said to have clock-wise rotation, while if it turns in the opposite direction it is said to be rotating counter clock-wise. It is sometimes desirable to change the direction of rotation. Possibly the simplest way to do this is to reverse the armature leads

*Chief electrician, Oliver & Snyder Steel Co., Oliver, Penn

A handy test set can be made for use at mines as shown in Fig. 4, using lamp sockets screwed on a conveniently sized board and connected in series. On a 550-volt circuit, five 110-volt lamps would be necessary, while on a 220-volt circuit, two. This set can be used to advantage in finding open or grounded circuits (see Fig. 5).

To determine the size of wire needed for any certain load it is necessary to know the amount of current in amperes, the distance traversed and the allowable loss in transmission. The following formula may be advantageously used.

$$\frac{C \times D \times 21.5}{L} = cir.mils.$$

Where

D = Distance in feet;
C = Current;
L = Loss in volts.

21.5 is a Constant always used.

Example—It is necessary that 100 amp. be carried 500 ft. on a 250-volt circuit with a loss of 5 per cent. in voltage, what is the circ.mils required? First the loss in volts, or 5% of 250 equals 10.5 volts.

$$\frac{100 \times 500 \times 21.5}{10.5} = 102{,}380\ cir.mils.$$

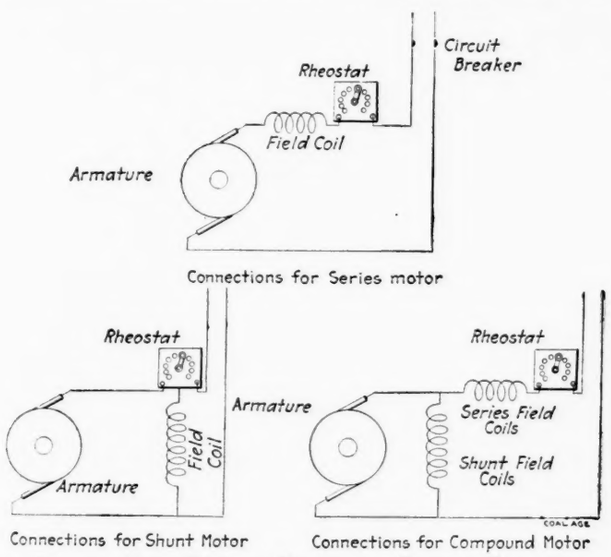


FIG. 3. THE THREE TYPES OF DIRECT-CURRENT MOTORS

If a wiring table is not at hand, the weight of any bare copper conductor can be roughly determined as follows: One thousand feet of wire having an area of 1000 circ.mils., weighs approximately 3 lb., and the weight per foot of any bare conductor can, therefore, be determined by multiplying its area in circ.mils. by 0.003.

SOME MOTOR TROUBLES AND THEIR CAUSES

It might be well at this point to discuss briefly the motor troubles that usually arise in and around the mine:

Loss of power—Usually an open fuse or circuit breaker, or the power may be off, or the field may be short-circuited or open.

Sparking at commutator—A small amount of sparking is not objectionable, but, if enough to blacken or roughen the commutator bars, the cause should be located and removed as soon as possible. Excessive sparking may be caused by the commutator being rough or dirty, by overload, the armature may have an open circuit, the field circuit may be weak, the brushes may not be of the proper dimensions or they may be improperly spaced. Brushes should be so spaced that the least number of commutator bars between sets of brushes is the total number of bars divided by the number of poles of the machine. If the armature has an open circuit and has been run for any length of time in this way, examination will show the mica between two of the commutator bars eaten out to some extent. The open will be found on one of the two sides of this mica. If the motor is provided with a brush-holder rocker, sparking at the commutator can be lessened by moving the brushes slowly backwards and forwards until the sparking is reduced to a minimum.

Electrical apparatus and fittings for use in mines are subjected to the action of acid-laden waters and excessive dampness, and all possible precautions should be taken against these evils in the selection and the up-keep of such equipment. All machine parts not intended to carry current should be grounded. This prevents anyone receiving a shock by establishing contact between such parts and the earth.

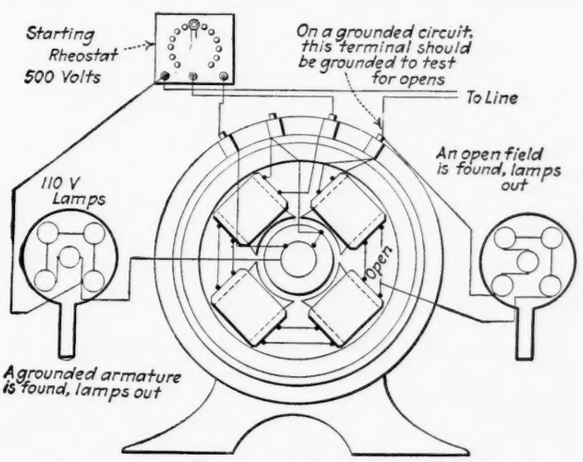


FIG. 5. HOW TEST SET IS USED IN LOCATING TROUBLE

In practically all coal mines direct current is used for the motor haulage, with a range of voltage from 220 to 500. The feeder lines should be installed on vitrified porcelain insulators, not more than 30 ft. apart. A separate insulator should be used for each wire. The trolley-wire hangers should be installed true with the track and as near the same height from the top of the rail as possible. This will minimize the jumping and arcing of the trolley wheel.

On account of the various sizes of locomotives used it is rather difficult to lay down a fixed rule for the placing of trolley frogs, but locating the frog from 10 to 12 ft. back from point of latch will be satisfactory for most conditions. Careful plumbing of the trolley hangers should be observed as a hanger not well plumbed will make a kink in the line. The effect on the trolley wire of a hanger that is not properly plumbed is shown in Fig. 6.

The trolley line should be installed as far to one side of the heading as practicable and securely and rigidly supported. The mining law of the State of Pennsylvania limits the sag between points of support to 3 in. Where

there is danger of feed wires or the trolley wires being touched in places such as crossings, etc., they should be well protected either by trenching the roof or by sideboards extending below the wire. All branch trolley lines should be fitted with automatic trolley switches or section insulators and line switches, or some other device that will allow the current to be shut off from such branch entries.

The Necessity for Careful Bonding

A close relation exists between the rails and the trolley wire and a well bonded system of tracks is as essential to best results as the overhead construction. The mining laws of most states recommend that where air or water pipes parallel the grounded return of power circuits, this return be securely bonded to such pipes at frequent intervals. This eliminates the possibility of a difference of potential between the rails and pipes and prevents electrolysis of the latter. The rail return should be of sufficient capacity for the current used, independent of the capacity of the pipes.

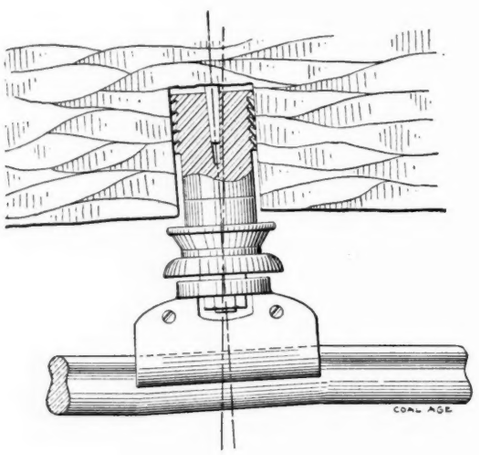


Fig. 6. The Effect of the Hanger Being Out of Plumb

On main haulage roads both rails should be bonded and cross bonds should be placed at points not to exceed 200 ft. apart. The rail is usually of sufficient capacity to carry the current, but it is at the rail joint that trouble, in the form of great resistance, is usually encountered. Resistance causes a loss in voltage when current is flowing and the drop is proportional to the current. For instance, if a rail joint has a resistance of 0.00012 ohms. and the current flowing through the rail is 200 amp. the loss in voltage at the joint would be 200×0.00012 or 0.024 volts, and as there are about 176 joints to the mile of 30-ft. rails the total loss would be 4.224 volts. The resistance of the rail itself must be added to this for the total resistance of the return.

Many mines use the channel-pin method of bonding. This consists of drilling a hole in the rail and inserting a round wire. A grooved steel plug is then driven in to tighten up the joint. This method of bonding is not good and should only be used for temporary work as moisture soon enters and destroys the contact.

The compressed terminal bond is the best method as the bond is compressed into a hole in the rail by a jack capable of exerting 10 to 15 tons pressure, thus causing the copper to expand in the hole and making a joint that moisture cannot attack.

Bonds should be tested at frequent intervals as poor bonding not only causes a loss of voltage, but also armature burn-outs on account of the machine drawing excessive currents due to low voltage. Bond testing instruments can be bought in the market, but the testing can be done by two similar millivoltmeters as shown in Fig. 7.

It is necessary to have a current passing through the rail such as a locomotive working ahead of the testing

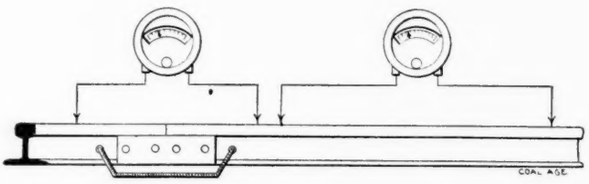


Fig. 7. Method of Testing Resistance at Rail Joint

point. One instrument spanning the rail joint will be deflected to a certain amount depending on the resistance of the joint and the current flowing. The other instrument lead is moved along the rail making continuous contact until the second instrument reading is the same as the first. Measurement of this distance will then indicate directly the number of feet of rail equal to the resistance of the joint.

The Great Lakes Disaster

The cable reports that Lloyd's, London, lost $7,500,000 in the recent storm on the Great Lakes. That loss equals the value of the Titanic. Twice as many lives were lost as with the Volturno. The incident ought to impress the lesson that the dangers of the Lakes rival those of the ocean. It has become the custom to take liberties with the Lakes because harbors are near, and voyages are relatively short. Cargoes are not carefully stowed, and the result is that ships sink or turn over because their contents shift.

If harbors are near so are dangerous shores, and lake-built craft cannot run before the storm as in the ocean. Craft of ten-knot speed cannot face a faster gale, and drift sternward with full steam ahead. Lake models are too long and low in proportion to their depth to be seaworthy. If they get into a seaway they roll until their cargo wets and trim is lost. The construction is good for ordinary conditions, but it lacks sufficient factors of safety for storms or for craft laden with ice, as Lake craft often are in the season.

The lesson is for greater engine power, for holds so divided that cargoes cannot alter their position and throw craft on their beam ends, for models designed for safety as well as for cargo capacity, and for enforcement of these standards in any suitable manner.—*New York Times.*

When determining the direction of an explosion the way in which stoppings and brattice materials are blown is not a reliable indication, as such structures are subject to secondary or return explosions.

Flame versus Electric Safety Lamps

By E. A. Hailwood*

SYNOPSIS—Currents of small voltage will ignite house coal gas or natural gas with coal dust in it, more readily than it will the unmixed natural gas. The presence of hydrogen appears to be the important factor but this gas is generated when acid is spilled on the iron can of portable lamps and is also liberated by accumulator batteries. The candlepower of mine electric lamps can be duplicated by modern flame safety lamps, and this intensity of illumination is unaffected by duration of time and is not obtained by the use of lenses and reflectors.

In view of the forces which have been brought to play to boom the electric lamp in recent times, the question now arises: Does it fulfill what is claimed for it, and is it really necessary or even an advantage to throw out such an old and trusted servant as the flame safety lamp, and replace it by electric illumination?

After some considerable experience in designing electric lamps, I am honestly of the opinion that the electric lamp of today is scarcely, if any better, than it was ten years ago; the principal change being the introduction of the metallic filament bulb.

I believe the Bureau of Mines has demonstrated that these small electric bulbs are capable of igniting gas and creating explosions, so that contention will be readily conceded. The other point I would like to make will need some further discussion, for some authorities have argued that sparks from a 4- to a 5-volt battery will not ignite mine gas.

Difference between Gas with Coal Dust and Without

I have lighted standard house coal gas in England from ordinary small 4- to 5-volt accumulators such as used in the portable lamp, but on trying similar experiments in a rough and ready manner on the natural gas of Pittsburgh, I failed to ignite it when using a battery of the same voltage, but on adding fine coal dust to the gas, an ignition was produced.

The batteries in this test were of the portable type, but somewhat larger than used in a portable electric lamp, but from tests carried out in England, as mentioned above, whereby an explosion was obtained from small portable batteries of 4 to 5 volts, it shows that the variation between the English house coal gas and the Pittsburgh natural gas has some bearing on the problem.

Dangers of Uncombined Hydrogen

The principal difference is that the English coal gas probably contains a greater percentage of hydrogen, but if it be borne in mind that acid when spilt on the "iron can" of portable lamps, evolves hydrogen, or that hydrogen gas is given off from an accumulator, it seems to me that it is possible for this hydrogen when mixed with the ordinary gas found in mines to form a mixture similar in composition and as dangerous in character as the house coal gas of England, which might possibly be ignited by a portable electric battery, even without the aid of coal dust.

In some experiments I made in England, an iron chamber with walls 3/8 in. thick and having accumulators placed therein, was hermetically sealed and afterward shaken so that the acid was spilled upon the iron floor of the box. The wires connecting the terminals of the battery were then short-circuited, so as to heat up the wire. A violent explosion ensued and the strong iron chamber was shattered. This test would seem to prove the possibilities of explosions originating from an electric lamp having an iron case.

The question may be asked: Do these tests apply to 2-volt lamps? These lamps, in my opinion, have not yet been in use sufficiently long to demonstrate that they are completely satisfactory. The experiments in England up to the present have shown that 2-volt lamps do not exactly meet the need, and that 4-volt lamps are more likely to be required, although from many points of view even they are still wide of the mark.

Lighting Cigarettes with a Battery

In an experiment I carried out within the last few days in Pittsburgh, I placed a piece of iron wire from a picture cord across the terminals of one of the small 2-volt electric batteries sold in this country and used in connection with the "cap" type of electric lamp. The wire immediately became red hot, and easily ignited a cigarette.

It will be seen, therefore, that the statements of some of the electric-lamp makers that it is unnecessary to lock the box containing the battery, are illfounded. But even if it be locked and safety terminals applied to the box, it is evident that a miner can easily stick two pins into the cable which connects the accumulator to the hat or cap lamp, and stretch a piece of thin copper or iron wire across the two pins and light a cigarette from the red-hot wire.

Or the miner may obtain a worn-out bulb, smash the glass, couple up a piece of thin iron wire to the broken pieces of filament, reinsert the bulb in the cap-lamp case and ignite the cigarette from the exposed red-hot iron wire. After replacing the proper bulb, no one would know that the lamp connections had been used for an improper purpose. Moreover, if he so willed he could make a dummy bulb. I have frequently made these experiments on electric lamps now on the market.

It will be evident that coal operators supplying miners with this type of lamp are really furnishing them with ready means for having a quiet smoke in the mine until the inevitable time arrives for mine and men to blow up.

Candlepower Dependent on Reflectors and Time Used

Electric-lamp makers often make somewhat wild statements regarding the great candlepower which they allege is given out by their electric lamps, but from investigations, it would appear that most of these so called

*Manager, Ackroyd & Best, Ltd., Arrott Power Building, Pittsburgh, Penn., and Morley, England.

Note—Closing part of article published last week in our columns under the title "A Defense of the Flame Safety Mine Lamps." The paper was prepared for the American Mining Congress, but this closing part was rejected because it was of too controversial a nature. "Coal Age" is open to all discussions of this kind if made honestly and in good faith.

high candlepowers are obtained by using a powerful lens and an efficient reflector. If the oil lamp be fitted with a lens and reflector in the same way, its candlepower can be shown to be exceedingly large and constant. The electric-lamp makers say very little about the rapid drop in voltage or the consequent drop in candlepower or of the rapid deterioration of battery and bulb.

Within the last few days, I have received a report that a responsible official of a large English mine who has made extensive tests with the most recent makes of electric lamps stated that the drop in candlepower, very shortly after an electric lamp is switched on, was more than 33 per cent., and his electric lamps are costing from two to three times more than flame lamps.

It will be obvious to electricians that a serious drop in candlepower must inevitably take place in a portable electric lamp, as the filament is exceedingly sensitive. If manufactured so that it will give anything like the desired candlepower when the battery is weak, the filament must be drawn so fine that when the battery is at full strength, the filament is likely to be burned out. Its resistance to the current cannot be so regulated as to give an equal illumination from the beginning to the end of a shift.

The common practice, therefore, appears to be to make the filament a little less fine than will give the best illuminating results, so it will stand the full force of the battery when fully charged, but this means that, as the battery discharges, the inadequate resistance of the filament prevents the now weakened battery from keeping up the candlepower.

A 1½-cp. electric lamp when the illumination is reduced to, say, 1 cp., is not so satisfactory as, for example, a ½- or ¾-cp. flame lamp. When a 16-cp. electric bulb has deteriorated so that it is giving, say, 8 cp., it is a most irritating light. Whereas an 8-cp. bulb giving its rated illumination would give a much more satisfactory light.

Summary of Merits of Flame Safety Lamps

In view of the enormous cost of the ordinary installation of electric lamps, the continued expense involved in their upkeep and the big sinking fund or depreciation to be written off annually and the mess they make (whether acid or alkaline), and keeping in mind the uncertainty incidental to electric lamps, the doubtful quantity of light given out by the lamp, the inability to detect gas and the fact that they may, nevertheless, cause an explosion, I submit that the electric lamp has not yet attained the perfection which would warrant its replacing for miners that old and well tried servant, the "flame safety lamp." Seeing that recent improvements in the flame lamp have made it possible to obtain from it an illumination of 1½ cp., and as this increased light can be secured for only a few cents per lamp per week, over and above the low cost already prevailing for flame lamps, it seems to me the popular acclaim of the electric lamp is not justified by its merits.

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Safeguarding Electricity in Mines

By Clyde G. Brehm*

SYNOPSIS—The majority of electrical shocks in mines result from contact with the trolley line. Many precautions are suggested for the safeguarding of men. How to remove a victim from a current-carrying conductor.

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For the government of outside electrical installations the National Board of Fire Underwriters have compiled a most complete book of rules consisting of about 175 pages.

When a piece of electrical work is completed or repairs or changes made therein the board is notified and their inspector calls and goes over the work. If in accordance with the code a certificate is granted, if not, no certificate is given until the work is put in strict accordance with the rules.

The great risk that the National Board of Fire Underwriters has to guard against is fire, but in the mines many things tend to make the use of electricity dangerous because, as a general thing, there is small space, little light and much dampness, so we not only have the fire hazard to contend with, but the more common risk of shock.

At this point I wish to compliment the author of the electrical section of the bituminous mining law of Pennsylvania. It is well prepared and most complete, and, if strictly complied with, practically solves the problem of safeguarding the use of electricity in mines.

*Chief electrican, Oliver & Snyder Steel Co., Oliver, Penn.
Note—Read before the Coal Mining Institute of America, Dec. 4, 1913.

Requisites in a Mine Electrician

The mine management should use great care in their selection of a mine electrician, for to quote Mr. Clark, of the Bureau of Mines: "The supervision of the electrical equipment of a mine is a task that requires ability, sound judgment and experience of a peculiar sort. To select suitable apparatus, to install it properly and economically, and to maintain it free from interruption of service at a minimum cost demands much ability. When the requirements of safety are added to the list of duties the responsibility is not lessened. The establishment and maintenance of a high factor of safety rests as much with the man who has direct charge of the electrical equipment as with anyone. It seems reasonable also to assume that a man who is competent to maintain a high factor of safety is no less able to maintain as low a cost of maintenance as is consistent with satisfactory operation."

I understand that in England and some other countries the mine electrician is required to pass an examination before he is permitted to take charge of the electrical equipment of a mine. If this were also true in this country we would have greater assurance of the efficiency and ability of the man in charge.

Another point to consider along this line is the state's inspection of mining electrical equipment. If it is important to have competent men in charge, it is just as important to have competent inspection. We cannot anticipate that our mine inspectors will be electrical engineers as well, but if one or two competent men were ap-

pointed to work with our mine inspectors and make rigid electrical inspections periodically it would do much toward safeguarding the use of electricity in mines.

Dangers of Contact with Trolley Wires and Locomotives

While alternating current is used at mines for running pumps, fans, etc., direct current is more commonly employed. The voltages usually selected are 110, 220 and 500, the 110 volts being used mostly for lighting. On account of its low pressure it is not hard to guard against as far as shock is concerned, accidents resulting from such voltage being rare. The 220 volts, however, has in several instances been known to kill, and naturally, the higher voltages are all the more dangerous and every precaution should be taken to escape shock.

Usually the track or the earth is used for the return circuit, so a person standing on the track or even the earth is in reality in contact with one side of the generator, and by touching the trolley wire, the bare parts of a switch or any other current-carrying conductor, he establishes a circuit and thus receives a shock.

Reports of the mine inspectors show that the majority of electrical shocks received in mines result from contact with the trolley line. The recommendations of the mining law of Pennsylvania, pp. 66 and 67, should be strictly observed in reference to safeguarding the men from the trolley wire, and exceptional care should be taken when traveling in the same entry with such a conductor.

A person cannot usually receive a shock by standing upon the earth or rails and touching the electric locomotive, because the frame is of the same potential as the rail and a shock can only be received when there is a difference of voltage. But the motor may be almost insulated from the rail by too much sanding or even coal on the track and in such a case the full line potential or voltage may exist between the locomotive and the rail. By touching the frame at such a time a person would receive a severe shock, and since all the cars of the trip are connected to the locomotive by their drawbars and hitchings a person can receive a shock even by touching them.

This particular danger could be eliminated by bonding the drawbars of all cars to their axles, and since it is hardly probable that the entire trip would be insulated from the rail at the same time, any one car in good contact with the rail would prevent the entire trip from attaining a potential above that of the rail, and no shock could be received.

Another Source of Danger

Another source of danger is equipment that is not intended to carry current becoming charged by defective insulation, or otherwise. This danger could also be eliminated, at least to a great extent, by connecting the conducting material of all such apparatus with the earth.

One other danger to be taken into consideration is the practical joker who connects up some innocent looking piece of equipment with live wires and waits to see the fun when some fellow employee receives a shock. The writer at one time saw a workman receive a severe shock when he attempted to take a drink of water from a tin cup that had been connected with a live wire. Such practices should be frowned upon and the guilty party severely punished.

It might be well in a paper of this character to consider ways to rescue victims of shock. It is essential that the victim be removed from the current-carrying conductor as soon as possible. If the switch is near at hand it is no doubt best to cut off the current, as the patient in contact with the live wire will transfer current to the rescuer if he puts himself in the line of its passage.

If the current cannot be cut off quickly use any of the following ways of removing the patient: By prying off with a dry stick. Possibly the handle of a pick, ax or shovel would be best as dry wood in a mine is not easily to be had when wanted quickly. The trolley wire may be short-circuited with the rail by throwing a crowbar or a drill across them. Great care should be observed in this manner of rescue, for if the iron does not leave the hands before touching the trolley wire the rescuer himself will receive a shock.

Removing a Victim from a Current-Carrying Conductor

The hands of the rescuer may, however, be insulated with dry clothes or otherwise, and the victim removed by jerking. If possible he should be removed by one motion, as rocking back and forth would only increase the shock and burns. Some authorities teach that it is best to use the feet and not the hands to push the victim from the wire. No doubt this is a good method if it can be used, for in case of shock to the rescuer the current would pass from one foot through the legs and the other foot to the ground and would do little injury since the heart and the important nerve centers are not in its path.

As soon as the victim is rescued, if he is unconscious, artificial respiration should be performed. This should be kept up at least an hour or until the patient is breathing freely.

Authorities differ greatly as to the best method of artificial respiration. Until late years the Sylvester method was used in the majority of instances, but recent tests seem to indicate that the Shafer or prone method is the more efficient. Often in electric shock severe burns or even broken limbs are sustained, and in cases of this kind the character of the injury determines the method of artificial respiration to be employed.

Electricity as a Cause of Mine Fires

We will probably never know just how many of our mine fires and explosions have been caused by electricity, but we do know that fires and explosions are possible (to what degree they are possible depending, of course, on other conditions) when the workmanship or the installation is defective or equipment is injured by falls of roof or otherwise. Incandescent lamps may ignite combustible material if placed in close proximity to it. The blowing of an open fuse may produce heat and a flash sufficient to cause a fire or explosion. Even switches may produce sparks enough to be dangerous.

It is a poor practice to use feeder wires that are insufficient in size as the overload may cause heat enough to soon destroy the insulation. A leak to the coal or across timbers may follow and a fire result.

Possibly the greatest danger, however, is from falls of roof destroying the trolley line. With this in mind care

should be taken not to over-set or over-fuse such circuits, for in case of an over-set breaker the trolley line may arc and spark against the rail for some little time before it develops load enough to open the breaker. It is quite possible that this was the cause of the Naomi explosion.

Suggested Precautions

In one of the publications of the Bureau of Mines appear several suggestions for reducing the number of accidents due to the use of electricity in mines; these will be a fitting conclusion for this paper:

1. Remove contributory causes.
2. Treat all wires, however well insulated, as bare conductors.
3. Remove from the vicinity of electrical apparatus all elements susceptible to its influences (gas, dust, explosives and combustible material).
4. Keep the electric current where it belongs.
5. If under certain circumstances the current cannot be entirely confined, at least limit the area of its activity by using protective devices.
6. Insure a high factor of safety by (a) selecting materials and apparatus with care, (b) installing equipment in a strictly first-class manner, (c) inspecting equipment frequently and thoroughly, (d) maintaining all electrical devices in and about the mine in good condition at all times.

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Cable Wiring for Mine Telephones

By Gregory Brown*

SYNOPSIS—Many kinds of conductors may be employed for mine telephones. Of the three types generally used the cable, although more expensive, is doubtless the most efficient, most durable and consequently the cheapest in the long run.

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There are several kinds of conductors that may be employed for mine telephone lines and an equal diversity of methods for supporting the same. The different arrangements vary in cost of material and installation, but generally speaking the most expensive are the most durable and satisfactory.

On account of the wide variation in the conditions which exist in mines and indeed in different parts of the same operation, no one type of installation can be recommended in all cases. As a general proposition, however, it is always better to be on the safe side and employ good material and construction, as in the long run this is cheaper and more satisfactory.

The following kinds of conductors are in general use for wiring mine-telephone systems: (1) cable; (2) braided rubber-covered, copper-steel or hard-drawn copper wire; (3) bare No. 10 B.B. double-galvanized iron telephone wire. When properly designed and manufactured, cable is perhaps the best type of conductor that can be employed for mine-telephone circuits.

Lead-covered cable has been used to some extent in mines, but in many cases has given trouble. The metal covering is subject to attack from dilute acids both organic and inorganic, it is extremely difficult to prevent electrolytic action especially if metal supports are used, the lead sheath is mechanically weak necessitating support at frequent intervals, while the constant jarring of the car or cage is often sufficient to cause crystalization and consequent parting of the cable.

Another Kind of Cable

For the above reasons lead cable in mines cannot be advocated for general use. Another type of cable is at present manufactured by the Western Electric Co., which is especially adapted for use under ground. This is known as circular loom cable, and is composed of braided rubber-covered twisted pair wires with jute filler, over this is woven a circular loom of heavy cotton which is impregnated with a waterproof compound.

The circular loom covering differs from that ordinarily employed, in that the strands are laid longitudinally and transversely, instead of being braided diagonally. This makes a much stronger fabric, as the pull on the cable is resisted by the heavy longitudinal strands. The standard type of cable contains a special rubber insulating compound, well adapted to withstand mine conditions. If desired, however, wires insulated with a high percentage rubber compound can be supplied.

The cable can be furnished with any size conductors desired, but the No. 14 B & S hard-drawn copper or No. 16 B & S copper clad are recommended.

Cable is much superior to other forms of conductors for carrying the telephone circuit down shafts. On account of its construction it will maintain its insulation better than single wires, and being a single strand it is easier to protect and install than are two or more wires. As the danger from falling slate or coal from the cage is always present, it is necessary to protect a cable when it is used in a shaft. In order to secure this protection armoring is often employed.

This type of cable is similar to that previously described except that it contains an additional covering composed of spirally-wound galvanized steel wires. Besides armoring there are several other ways of protecting a cable, one of which is shown in Fig. 1. This method serves to support the cable as well as protect it, and consists of a wooden casing covering the entire length of the conductor. Each section of this casing is composed of two parts, the lower portion being grooved to approximately fit the cable and the cover fastened down in such a manner that it exerts a clamping pressure.

Another effective method that is used for protecting cable is to run it through conduit or piping. When the shaft is of considerable depth, it is necessary to support the cable by means of suitable clamps placed in iron boxes provided with covers which exclude the moisture. These boxes are either tapped for the pipe or lock nuts and rubber washers employed.

The box and clamp are shown in Fig. 2. When the shaft is not too deep a single clamp at the top is generally sufficient to properly support the cable.

*Western Electric Co., New York.

Unreel a Cable from the Cage

When installing cable in a shaft, it is bad practice to unreel it from the top, as this method permits the total weight of the cable to come upon the conductors before the supports are in place. This condition is extremely liable to cause either the wires to break or the cable to part entirely. The best means for putting such a conductor in place is to fasten one end in a clamp at the top of the shaft, then place the cable reel on the cage and proceed toward the bottom, successively placing clamps at the proper intervals.

When each such fastener is being attached to its support in the shaft, it should be so placed that there is a trifle of slack between it and the next preceding clamp. By proceeding thus, it will be assured that each support is carrying only its proper length of cable.

Supporting the Cable from the Roof

A good means of fastening the cable to the roof is shown in Fig. 5. Here is illustrated a piece of 1¼-in. pipe, 8½ in. long, which has been split with a hack saw for a distance of about 3 in. from one end. In this end of the pipe is inserted a metal or wooden cone, the largest diameter of which is slightly smaller than the outside diameter of the pipe.

At the other end of the pipe there should be drilled in a transverse direction two holes, suitable for bolts to hold the cleats, shown in Fig. 3 and 4, in place. A hole of suitable diameter is drilled in the roof for a distance of about 5½ in. The pipe plug is driven home in this hole, care being taken to see that the center line of the transverse hole is in the right direction to insure the clamp being in the proper position for supporting the cable.

The use of split pipe for cable support has been found satisfactory in places where the roof or sides were of such material as to make it difficult to provide a fastening. Under these circumstances the same method has been used as previously described, except that the pipe is made much longer, and the rock drilling correspondingly deeper. The depth of the hole and the length of the pipe can best be determined from the nature of the material encountered.

Another somewhat less expensive method of support is shown in Fig. 6. In this arrangement a special creosoted wooden expansion plug is used which contains a hole through its center, and is also slit halfway through. At the rear is a conical opening into which fits a wooden

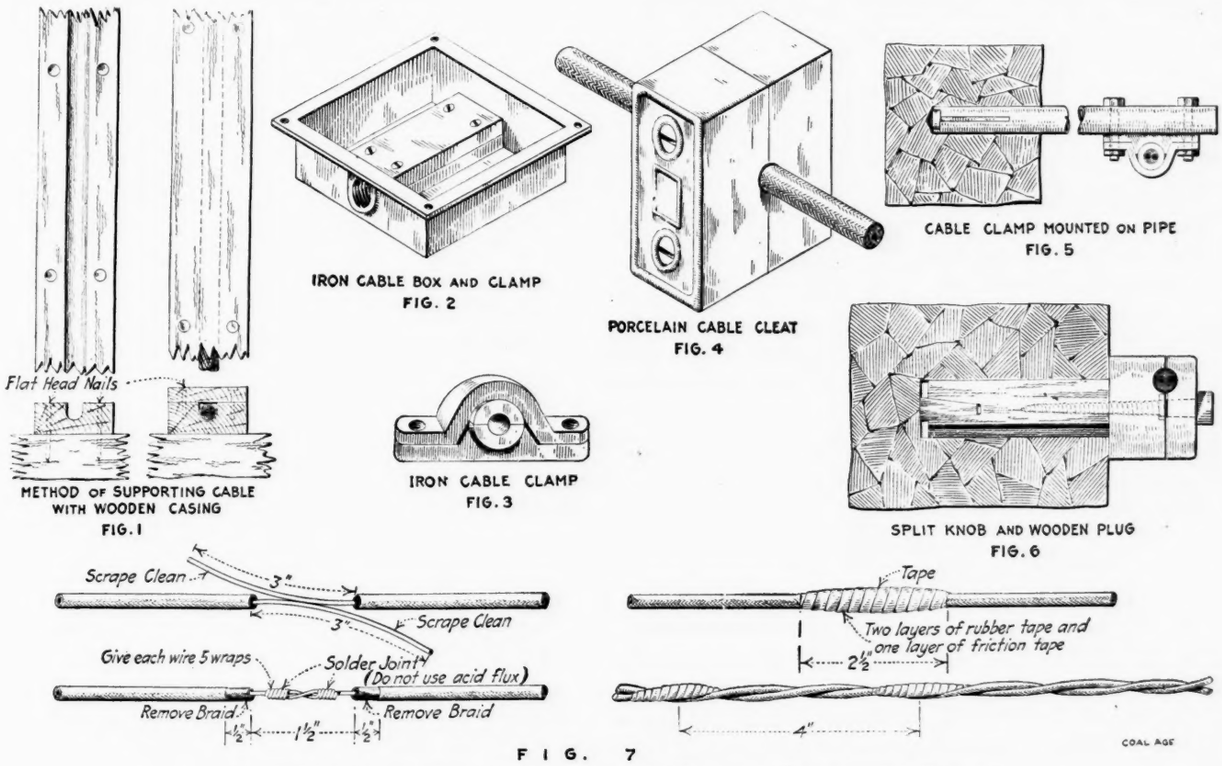

FIG. 7

Means of Protecting, Supporting and Splicing Telephone Cable

There are several methods employed for running cables in roads and entries. In cases where the road is timbered, it is good practice to fasten the cable to the frames by means of insulated iron clamps or porcelain cleats. The insulated iron clamp is shown in Fig. 3, and is well adapted to this service. It is fastened to the timber by means of wood screws. A commercial type of cleat that is also used is shown in Fig. 4. The porcelain cleat is not quite so suitable as the insulated iron clamp on account of the fact that it is more easily broken. The clamp and cleat of the size shown are suitable for two-conductor circular-loom cable. They can, however, be furnished with various sized openings adapting them for cable larger than the two-conductor.

In order to avoid being injured by the cars in time of wreck, it is advisable to run the cable in an upper corner of the roadway. In some cases, the cable has been placed back of the timbers, but this is poor practice, as it is difficult to get at in case of trouble. Where there is no timbering, but the roof is good, it is satisfactory to suspend the cable therefrom.

cone, which expands the plug when the latter is driven home, this causes the plug to be held securely in place. A split knob, as illustrated, is then screwed into position.

This latter method of support is not quite so strong as the former, but in cases where the roof is good it has been used with success, care being taken, howevr, to support the cable at frequent intervals. Where the pipe, plug and clamp are used, a distance of 20 ft. between supports has been found satisfactory. Where the roof is uneven it is often necessary, of course, to decrase this distance. Care should also be taken to see that the cable at no point touches the roof.

Other Means of Protecting a Cable

Cable is sometimes run in a conduit and in some cases this has been fastened to the ties. This serves as a good protection for the inclosed conductors, but is open to the objection that injury is liable to occur in time of wrecks. There have been cases also where armored cable has been employed on roadways. This form of conductor possesses great strength and ability to resist crushing.

A good way to install armored cable is to place it in a shallow trench upon a layer of sand. Rough boards are then laid over the cable, and the trench filled in; the office of the boards being to eliminate danger from picks or crowbars injuring the cable.

A notable instance of the advantage of using armored cable occurred recently at the Hulton Colliery, in England, where hundreds of tons of rock fell and many lives were lost. After the accident it was found that the armored power cables were not injured in the slightest way. This feature is important as it makes it possible in cases where falls of roof occur and men are imprisoned, to still maintain telephone communication.

How to Splice a Cable Properly

In making repairs or in joining one length of cable to another, the splicing operation should be performed as follows: The cable insulation should be removed for a distance of about eight inches from the end of each piece, leaving the braided, rubber-covered wire exposed. Over one end should be slipped a piece of circular loom of sufficient length to cover the whole joint when completed. One of the projecting wires in each cable is then cut off so that it extends a distance of about four inches. The rubber insulation should then be removed from each end of the four wires for a distance of three inches, care being taken to see that the wire is not nicked in removing the insulating material.

The short wire of one cable is then twisted around the long wire of the other as shown in Fig. 7. Each joint should then be soldered using rosin core solder for the purpose. Ordinary soldering salts should on no account be used as it is impossible to get rid of all the acid, the presence of which will cause corrosion to take place.

After soldering, the braid on each wire should be removed for a distance of one-half inch, each joint should then be covered with two layers of pure rubber tape, starting the taping operation on the rubber insulation from which the braid has been removed, and terminating it upon the insulation on the other side of the joint. Okonite pure rubber tape is highly suitable for this purpose.

After taping with the Okonite, one layer of adhesive tape should be used, then starting from the cable sheath, two layers of adhesive tape should be wound around the two wires together. After this the circular loom should be slipped back over the joint and taped in position.

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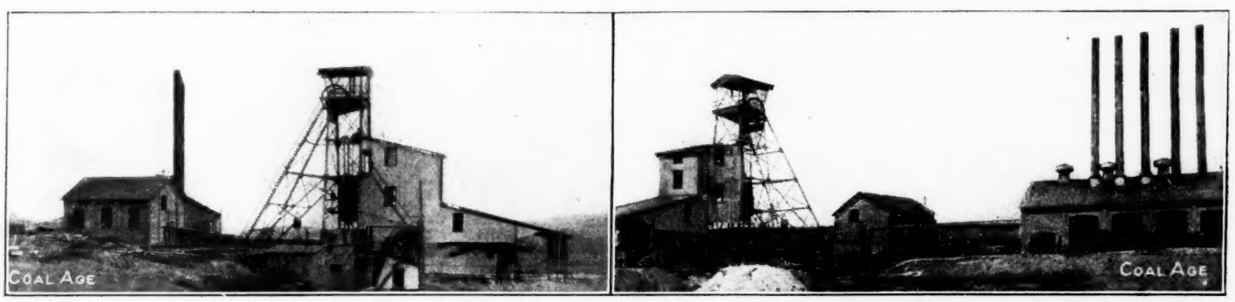
Troubles at the Nigger Head Mine

By J. C. Lawler*

About 18 months ago, the Nigger Head Coal Co., of Walsenburg, Colo., after drilling 800 ft., located an excellent bed of coal. The company immediately started digging a shaft about 200 ft. from this test drill hole, erected a steel tipple, constructed all necessary buildings of brick or concrete and installed the latest approved machinery.



Front and Rear View of Nigger Head Upper Works

At a depth of 200 ft. in the shaft a flow of water approximating 200 gal. per min. was struck. At 500 ft. an additional influx of 400 gal. was encountered, and at a depth of 630 ft. a large volume of water was encountered so suddenly that the men in the shaft were barely able to escape. At the time there was a 1200-gal. steam pump, located at the bottom of the shaft and two smaller pumps at a higher level. These were all quickly flooded and soon refused to work.

The water rose to within 250 ft. of the top of the shaft and two balers each of 1400 gal. capacity, which may be seen in the accompanying photograph, were employed and succeeded in lifting 1800 gal. of water per min. for nearly three weeks without lowering the water any appreciable amount.

It is estimated that 2100 gal. are flowing into the shaft per minute from a pocket, and that this flow will reduce to approximately 700 gal. after a time. To find an economical method of removing the 2100 gal. is the problem which the owners are now facing. While several methods have been suggested, it has been deemed expedient to suspend operations until a decision can be made.

*Electrical engineer, Walsenburg, Colo.

EDITORIALS

The population of the United States has increased for the last fifty years at an average rate of 23.5 per cent. per decade, from 31,443,000 in 1860 to 91,972,000 in 1910. At that rate of increase the population will be 113,475,000 in 1920. The demand for bituminous coal has increased at an average rate of 62 per cent. per capita per decade, from 0.262 tons per capita in 1860 to 4.54 tons per capita in 1910. If this rate of increase in demand is maintained during this decade, a production of 835,176,000 tons will be necessary to satisfy it in 1920.

Safety and Insurance

Safety can never be so certainly secured as it will be when the operator is definitely responsible for the life and limb of the employee and must insure both. It is true that the operator is now obliged by law to use safeguards, and the operative should have interest enough to protect himself. It is also a fact that the operative knows or should know the dangers when he accepts the service, and his judgment as to the risks is always available to tell him if it is better to quit work than to continue to labor. True it is, that insurance leads to malingering and, as it protects the workman from want even though penniless when injured, it is an enemy of thrift. It is no reply to say that this is true of all insurance for only the most enterprising, active and thrifty who despise malingering carry adequate policies, and the paying of the recurring premiums is an act of thrift in itself.

Yet, after repeating all these arguments, we must admit that insurance of the workingmen is going to be the prime argument for safety. One advantage about insurance is its elasticity. It restrains often without commanding. If you have a detached house, if it is built of fireproof materials, if your factory has water-sprinkling devices, you pay less insurance. You are not obliged to make such improvements, but the yearly reminder of the agent calls attention to the true economy of such provisions. At mines we have regulations which do not apply to erections and excavations "made prior to the passage of the act," but the insurance agent pays little attention to the date of erection. You can build almost as you will and entirely when you will, but you shoulder the cost of such reckless erection. Those breakers built over mine shafts, torn down perhaps all but a stick and then re-erected would never have been rebuilt if the company carried an insurance policy on every man in the mine.

The economy of production in various states will be made far more equal when an equal liability is enforced for the lives of the miners. The laws regulating safety may be unequal in severity but the inexorable insurance adjuster will make unsafe operations unprofitable.

No power but that of the insurance companies keeps our village fire departments in comparative efficiency. The analysis of conditions by the adjuster is always followed by renewed activity among the fire fighters. And we may be sure that when the insurance adjuster and the mine inspector combine to bring pressure on an operator, there will be a real change in mining conditions.

The threat of the forfeiture of a policy will act like a charm on the negligent. The law may not threaten; the inspector may be harmless; only the insurance man will condemn and yet the change will be made. There is a degree of unfairness in an act which subjects the company to damage for the pernicious folly of a subordinate, but if it works to make mines safe, our regrets will always be fewer than our gratulations.

Anthracite Sizes

During the last few years there has been a more or less persistent complaint regarding the great variety of anthracite sizes. Consumers are finding the large number of grades cumbersome to handle and unsatisfactory, and there is a feeling that the business would be greatly simplified by a reduction in this number.

The consumer appears to have reached the conclusion that stove coal is more satisfactory and economical for the house furnace than egg, and since there is no differential in the price, as was the case in former years, an abnormal demand has developed for stove coal in the Eastern market.

In the Western market the short size is chestnut, this comprising 50 to 60 per cent. of the business. In order to relieve the pressure in this grade, an advance of 25c. per ton was made on it. The results were satisfactory, insofar as reducing the demand on this particular size was concerned, but it threw a large proportion of the consumption on stove coal, which was already in such short supply in the East. A differential of 25c. per ton between egg and stove would no doubt do much toward effecting a proper distribution of the demand over all three sizes.

Another solution of the difficulty would be the elimination of a number of the sizes as already mentioned. Thus, egg and stove might properly be combined, as well as chestnut and pea and, finally, all of the buckwheats. From the standpoint of the trade, it is clear that this would do much toward wiping out the occasional shortages in different grades, and would also make the business much easier to handle.

One condition is already being developed which may gradually prove at least a partial corrective of the shortage difficulty. This is the gradual reduction in the output of broken coal. This grade finds its principal application in the manufacture of gas and, occasionally, in industrial manufacturing; it is a much higher grade fuel than the smaller sizes, the adopted standard specifying a maximum impurity of 2 per cent.; this coal has been selling on an average of about $1 per ton less than the next large sizes.

Under the present arrangement, it is clear that there is a certain justification in the occasional premiums demanded by the individual operators. Not being equipped with large storage facilities, they are naturally compelled

to move shipments when same arrive at destination. Thus, when a certain grade is in excess supply, as is now the case with egg, the individual must offer special inducements in the way of concessions in order to dispose of his product. Such being the case, it is but natural that he should expect to recoup his losses by demanding a premium when the market justifies same.

Another possible solution of the shortage problem would be to advance stove size 25c. per ton in the Eastern and Northern markets, putting it practically on the same basis as chestnut; the price of egg in the East would remain unchanged but might be reduced 25c. per ton in the West and Northwest. Only about 15 per cent. of the Western tonnage is made up of this grade, so that any loss by this reduction would be more than compensated for by the 25c. advance on stove coal in the Eastern market.

The Attack on Dr. Parker

We publish today an attack on the paper read by Dr. E. W. Parker, of the Geological Survey before the American Mining Congress on Oct. 23, and recorded in our issue of Nov. 1. No other course was open to us, as the statements were made by competent authority. We cannot, however, express ourselves in perfect agreement with the suggestions of our correspondent. Certainly we do not understand his Latin view of the duty of public officials. In Latin Europe it is the part of the judge as well as of the public prosecutor to secure a conviction of the accused and from what we have read it does not appear that he very often shirks the performance of that judicial duty. In fact, it is often the denunciatory questioning of the judge of which the alleged criminal is most afraid. Mr. Davies believes that it is the business of every public officer be he connected with the administration of justice or engaged in any other capacity not in any way connected therewith, to refrain from giving utterance to his conclusions if they differ from those openly expressed by the head of some government department. We do not believe any such doctrine; nor does he, when he chances to agree with the views of the dissentient.

We grant, however, that if Mr. Parker is wrong he is the more subject to criticism because he is a public officer. But we must always remember that there is little so vicious, so undermining to the public weal as a bureaucracy which determines just exactly what the public shall know. When all the officers who are paid to tell the public "the truth, the whole truth, and nothing but the truth," tell just as much as one department or one bureaucrat decides it is best for the public to know, then it is time for a change in administration and the voters should arrange such a change at the first opportunity.

Just at random we shall take exception to a few of Mr. Davies' statements. Some may be more impressed with other false conclusions, and Doctor Parker will doubtless meet most, at least, of those to which we do not call attention. Mr. Davies says, "If they"—the anthracite companies—"are clearing 20c. per ton now, where, in the name of common sense were they coming out before they tacked on that 25c. per ton." He is not just enough to inform the reader that when that increase was made, it barely offset the change in the wage scale. The gain was so small that it is negligible as an a gument.

Mr. Davies divided the figures charged for royalties by the total production, and because the average royalty figures as 11.36c. per ton, he declares that the public is being hoodwinked. Incidentally we cannot see what interest Doctor Parker or the anthracite companies could have in reducing the alleged cost of coal by suppressing the royalty payments that the latter are obliged to pay to private interests. We overlook that matter, however, and quote Mr. Davies: "Royalties run up to 80c. per ton on prepared sizes and 50c. and 60c. royalties are numerous."

Mr. Davies is like the average New York consumer; he overlooks the fact that the charge on prepared sizes is a most unfair criterion because a third of the coal does not come under that head. But still more important is the fact that most of the contracts on which the royalties are now dependent were closed long ago and are for much less than present-day figures and some of the companies are mining coal on which no royalties are being paid, for the coal is owned outright, and even where royalties are due, we understand that at least one large company is defaulting in their payment. As for coal in the streams and below them and in the culm banks, it is for the most part free of royalty. Consequently to divide the royalty charge by the whole production of the anthracite field is entirely misleading.

Such statements as we have quoted give evidence of partisanship and as the remarks of Mr. Davies do not show any data as complete as those of the census, we confess we cannot feel convinced that he has in any way proved his case. Whether the single colliery instanced is evidence of a general condition is open to doubt.

The difficulties in the Pottsville field are so severe that for a long time it remained comparatively undeveloped and today it is generally recognized that coal in that region is mined under exceptionally unfavorable conditions. In some other part of the anthracite regions old and inefficient plants make the cost of mining more than it should be. The age of the field bears a heavy hand on some of the operators who have failed to clean up and replace the leavings of a past generation. Though perhaps the public should not pay for such inefficiency, certain it is that it creates a situation which Doctor Parker has stated. He has not entered into the engineering problems with which the subject is beset, but has merely declared what the census figures exhibit.

Enforced Economy

In the scientific world, as in our moral and physical life, proper measures of conduct bring their own reward. For this reason, it is always safe to regulate and rule our methods of engineering procedure in exact accordance with a plan that admits of no carelessness and tends toward an ideal condition.

The aim of all science is to eliminate waste and to increase the sum total of human happiness. Campaigns for the accomplishment of this latter end have often, if not always, resulted in new invention and increased technical efficiency.

When we pollute our streams with impurities from our mines, or poison our atmosphere with fumes from our coke ovens we are adding to human misery and acting in an unscientific manner. But above all else, we are wasting something that should not be thrown away.

LEGAL DEPARTMENT

Effect of "Strike Clause" in Fuel-Sales Contracts

By A. L. H. Street*

SYNOPSIS—A strike, to be available as an excuse for failure to deliver, need not always arise at the seller's mine. But mere increase in cost of delivery, because of a strike, does not excuse failure to perform. How specific agreements have been interpreted by the courts. The clause should be expressly stated in the contract, but may be inferred from custom and printing on letter head.

Provision in a contract to sell coal or coke that deliveries shall be subject to strikes and other causes beyond the seller's control has been the subject of judicial interpretation in many appelate court decisions, to say nothing of a larger number of cases which have not gone beyond the trial courts, and the still larger number of disputes which have been adjusted without any litigation.

It has been held that a contract to deliver subject to strikes beyond the seller's "control," binds him to deliver unless there is a strike so far beyond his control as to make performance of the agreement impossible (Virginia Supreme Court of Appeals, Smokeless Fuel Co. vs. W. E. Seaton & Sons, 52 Southeastern Reporter 829).

In a suit passed upon by the United States Circuit Court of Appeals, Fourth Circuit (Cottrell vs. Smokeless Fuel Co., 148 Federal Reporter 594), it was decided that breach of a contract of sale on the seller's part was not justified under a "strike clause," through the mere fact that the cost of delivery was increased on account of the expense incident to suppressing a strike.

The court said: "What is meant by the phrase 'beyond the control of the party of the first part?' The contract was for the delivery of coal from a certain mine, and evidently the strikes contemplated at the time of making the contract were strikes at that mine. So far as appears, the defendant (the seller) had nothing to do with the actual operation of the mine. It was simply dealing in the product. Necessarily, therefore, the conclusion to be drawn is that a strike, in order to affect the contract, must be such as to be beyond the control of the operators of the mine.

A Case in New York

On the other hand, the New York Court of Appeals has held that the fact that a strike of employees was directly caused by a reduction in their wages, made in good faith and upon reasonable business principles, did not take the case beyond the terms of the "strike clause," contained in a certain contract of sale. (Delaware, Lackawanna & Western R.R. Co. vs. Bowns, 58 N. Y., 573.) In this case it appeared that plaintiff contracted to deliver to defendants a certain quantity of coal. The contract contained a clause providing that "every effort will be made by the company for the fulfillment of its contracts, * * * * but if, at any time, the business of the company is so interrupted by * * * * strikes among miners or other employees, * * * * as materially to decrease the quantity of coal, * * * * the company will not hold itself liable for or pay any damages sustained by reason of the non-delivery of the coal now sold."

In consequence of a reduction of wages, a strike of the miners in plaintiff's employ occurred, interrupting its business and preventing it from obtaining all the coal called for. In a suit brought to recover the price of fuel delivered and defended on account of the seller's failure to deliver all the coal contracted for, it was held that the clause quoted was a limitation upon the absolute undertaking to sell and deliver; that plaintiff was not precluded thereby from conducting its mining operations upon the same general principles it would have been governed by had the contract not been made.

Nor was the company required, the Court of Appeals decided, to resort to extraordinary or unusual means to prevent strikes, but, by necessary implication, had the right, irrespective of its affect upon the action of its operatives, so long as it was done in good faith, and solely with a view to its general business, to adopt such rules and regulations and pay such wages as were usual, reasonable and proper under their circumstances.

Strikes at Mines Other Than Sellers

That a "strike clause" may be construed as including strikes other than at the seller's mines has been decided by the Massachusetts Supreme Judicial Court. Defendant company contracted to deliver coal at Greenwich, Philadelphia, on condition that the company should not be responsible for damages from strikes. The coal was seized in transit by the carrier and used by it as fuel on account of scarcity of coal.

In releasing defendant from liability for failure to deliver in this case (David vs. Columbus Coal Mining Co., 49 Northeastern Reporter 629) the court said: "The performance of the contract was prevented by a strike; and we see no reason why the word 'strikes' should be restricted so as to apply merely to the case of a strike at the defendant's own mines. It is broad enough to include any strike having a legitimate tendency to prevent the execution of the contract, if the defendant was in the exercise of due care and diligence."

That a "strike clause" may become a part of a contract of sale, in view of a trade custom and through being printed on the letter-head of the seller upon which acceptance of the buyer's order is written, was recently decided by the Kansas City Court of Appeals in the case of Eaton vs. J. R. Crowe Coal & Mining Co., 142 Southwestern Reporter 1107. But, of course, it is a much safer plan for the seller to see that his contract, whether the agreement be formal and signed by both parties, or be constituted by a written acceptance of an order, contains the clause in express terms, rather than rely upon a trade custom or on a printed statement on a letter-head.

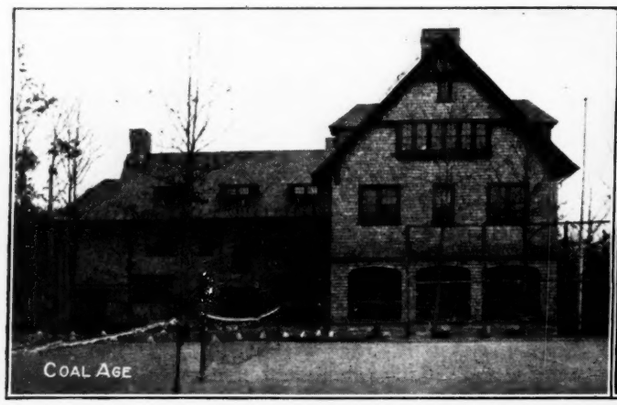
*Attorney and Counselor at Law, St. Paul, Minn.

SOCIOLOGICAL DEPARTMENT

Welfare for Mine Workers

By E. H. Suender*

Astute managers of industrial operations and particularly mine managers have for some time recognized the necessity for welfare work among their employees; not because of any demand from the employee but because they know that coöperation between capital and labor is not only conducive but essential to the successful operation of any business. Many corporations have expended large sums of money in this direction and from all accounts such expenditures have been fruitful, at least in part. Promote prosperity and happiness among your men and you slowly but surely raise their efficiency and unconsciously cause them to become better citizens, better fathers and better husbands, all of which tends to uplift the community standard. There is probably no other field that presents a greater opportunity for this work than the coal fields.



The Old Company's Clubhouse Built in 1910 and Owned by the L. C. & N. Co. Houses, at Cost, 40 Single Men

Dwelling Houses of the Various Department Heads of the Lehigh Coal & Navigation Co.: Built in 1913

The Personal Element in Social Development

The problem how best to attain the desired results is one that deserves diligent study on the part of us all. There is no use crying and writing "welfare for the worker" and then refusing or neglecting to right wrongs which we are well able to correct. Such wrongs do exist in the anthracite field today and our own section is not immune from them. A welfare or uplift movement to be successful must be genuine. Give the average workman, whether American or foreign born, a living wage, a comfortable and sanitary home, a chance to educate himself and children, a place of respectable entertainment, proper working conditions, some assurance that his family will be cared for in case of partial or permanent disability and last but not least a good boss, a disciplinarian who recognizes good work and never fails to say so when he sees it, and I venture to say that you have a good and efficient workman.

Capital may spend vast sums on welfare work for its employees but if it fails to engage men in control of enterprises who will through their fairness with the workmen slowly but surely win their confidence and cooperation, its efforts will not avail. That all the good accomplished in months of ardent work by able men has been destroyed through illtreatment of employees by unscrupulous bosses full of mossgrown ideas is an undeniable fact.

The Foreigner Lives Squalidly Here to Earn Comforts for Ease in Europe

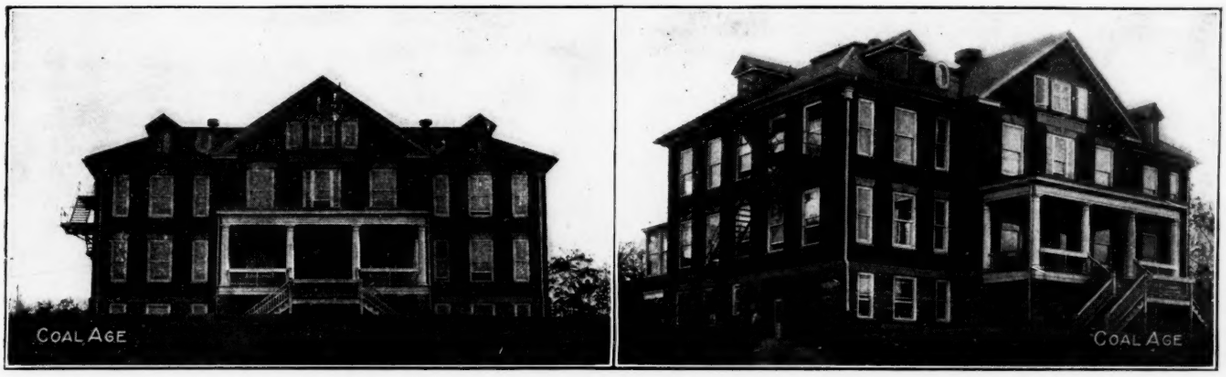
There are approximately 100 coal companies employing 175,000 toilers in the anthracite industry; 58 per cent. of the workmen are foreign-speaking and this percentage is steadily increasing. This army of toilers in a strange land are not all accustomed to our mode of living and many in their eagerness to accumulate some wealth and return to their native country prefer to live in environments below the standard of the average American workman. It behooves the employer to formulate and put into practice, plans which will raise their manner of life and thus further prosperity and happiness among them. That the condition surrounding these men is gradually improving cannot be disputed, and that it is still sorely in need of betterment is undeniable.

The Bad Feeling Existing in the Anthracite Fields

That the relationship existing between employer and employee is more or less strained, due to sins of omission and commission on the part of some employers and some employees, is a well known fact, as evidenced by the records during the first year of the last agreement between operators and mine workers. There occurred during this period, for various reasons, 165 petty strikes involving

*Chief clerk, mining department, Lehigh Coal & Navigation Co., Lansford, Penn.

Note—Article read before the Panther Valley Mining Institute, Lansford, Penn.



TWO VIEWS OF THE PANTHER VALLEY HOSPITAL, BUILT BY L. C. & N. CO., ITS EMPLOYEES AND BUSINESS MEN IN 1910 AND TAKEN OVER BY STATE, JANUARY, 1913

140,000 men, causing a loss at the various operations of over 400 days, a loss to the mine workers of nearly $1,000,000 and a loss in output of over 600,000 tons. Losses such as these are unrecoverable, especially to the workmen. The question is what shall we do to correct this and other evils.

First—Labor should be treated fairly and squarely under all circumstances and all conditions. No matter how illiterate a workman may be he surely recognizes fair treatment and kind words and in return is invariably willing to give you the sweat of his brow. A horse will do better work if treated kindly but firmly; why should not a man? The practice of cursing workmen is, or ought to be, a thing of the past and corporations who spend money on welfare work had better keep that fact in mind until they have cleaned out every boss who adheres to that eighteenth century practice. The workman is entitled to the same fair treatment that every boss expects to get from his superior officer.

Second—Labor is entitled to a living wage. This point is settled by agreement between the operators and mine workers and during the contract period there is no dissatisfaction of any consequence on this question.

COMPANIES ARE ENDEAVORING TO PREVENT ERECTION OF SHACKS

Third—Labor is entitled to a comfortable and sanitary home at a reasonable rental; this is absolutely essential to insure health and morals. Here we find a field where much capital must be expended if we wish to house the many toilers in comfort. Much commendable work has been done but much yet remains to be accomplished. It is true that many shacks photographed and spread broadcast to mold public opinion during labor troubles were built by foreign-speaking employees on leased ground but the operators are in position to correct this evil, at least in part, and it is gratifying to know that all the larger companies and many of the smaller ones are slowly but surely replacing such shacks with modern residences for workmen or at least are not erecting any such buildings on their grounds or permitting them to be erected.

Some companies have offered prizes, in mining communities, to their employees for the best kept lawns, the best gardens, etc.; this naturally is an incentive that will tend to produce excellent results. In mining communities and boroughs in particular where ground has been sold for building purposes; building regulations exhibiting "horse-sense" should be enacted and enforced to prevent unscrupulous persons from building dwellings of the shack type.

THE NEED FOR EDUCATION

Fourth—Labor is entitled to an opportunity to secure a fair education. 58 per cent. of the 175,000 workers or 100,000 workmen representing a family population of 300,000 persons in the hard-coal field are foreign-speaking and many are poorly educated and furnish a wonderful opportunity for educational activity. The community and the corporation which fail to provide the opportunity to this army of uneducated to secure a proper mental training at little cost are guilty of a great wrong which cannot easily be righted. This is truly a missionary work

DWELLINGS WITH ALL MODERN IMPROVEMENTS FOR DEPARTMENT HEADS ERECTED RECENTLY BY L. C. & N. CO.
Built 1910-1911. Built in 1911

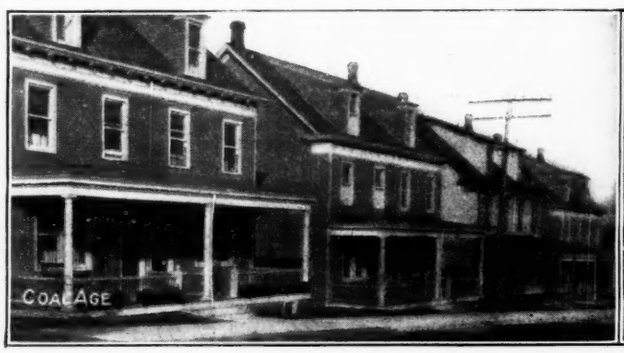
and is recognized as such by many corporations in and out of the coal field which are educating their employees today.

The public school compulsory education system is taking care of the child until he reaches the required age of 14 when he invariably goes to work in or about the mines. The mining institutes throughout the coal fields with a membership of 7000 have organized night schools and have accomplished excellent results.

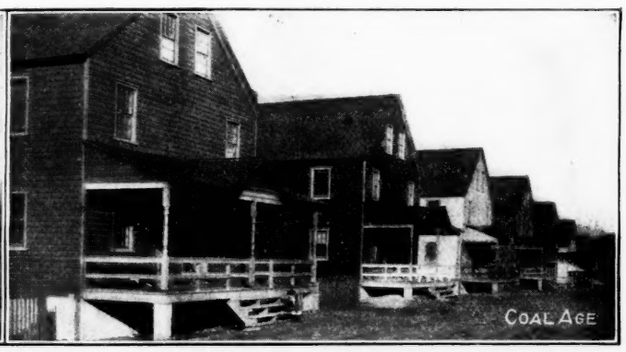
The Panther Valley Mining Institute in this section has upwards of 400 members and has enrolled in its night schools 132 scholars and during the past year showed an average session attendance of 42 pupils. Reading, writing, arithmetic, mining, mechanical and electrical engineering courses were taught at an average cost to the pupil approximating $2.

I had the pleasure of attending practically all the school sessions during 1912 and 1913 and had a chance to note the interest displayed. It is not improbable that these classes may furnish our future bosses and possibly superintendents. As our President, S. D. Warriner, told you at our annual banquet we cannot give you this education but we are ready to give you the opportunity to get it; all you have to do is to attend the sessions and apply yourselves. You have been told before that it is the purpose of our company to recognize worth as it develops in these schools and to promote scholars to positions as quickly as they fit themselves for them.

We want to enlarge on our school work and to give any of our members a chance to enroll and study with us because we know that by helping the worker, we help the employer and the employer always needs the best you can give.



RESIDENCES OF L. C. & N. CO.'S MINE FOREMEN WITH STEAM HEAT, ELECTRIC LIGHT AND OTHER MODERN IMPROVEMENTS



FIVE-ROOMED, SEMI-DETACHED MINERS' HOUSES WITH CELLARS. PRESENT TYPE OF CONSTRUCTION; BUILT IN 1913

WEEDING OUT THE DRUNKARD

Fifth—To further the welfare and happiness of labor, proper entertainment must be provided. By "proper entertainment" I mean theaters and playgrounds, swimming pools, ball fields, gymnasiums and reading rooms where men, women and children are attracted and can congregate during holidays and other leisure times. I am sorry to say that the most popular place of entertainment throughout most small mining towns is the saloon. The bar-room in the coal fields is not a necessity and if any good is to be accomplished along welfare lines in any mining community, the first thing to do is to exterminate such grog shops and wholesale dealers as are doing business illegally. That this type of liquor traffic has done much to disrupt coöperation between employer and employee is undeniable. We all know about the pay-day drunks and it seems that the mining industry stands alone in permitting its employees to lose time whenever they see fit to indulge in this old-time custom.

If the coal industry ever expects to eliminate from its service workmen who indulge in pay-day drunks they must first make certain that none of their bosses practice this demoralizing habit.

As a community we ought not to be lenient with the saloon-keeper or wholesale dealer who carries on his business illegally and I believe that many of them do so, but on the contrary all good people should use their best efforts to stamp out this stain which unfortunately has a strong grasp on many mining towns.

Straighten out the saloon practice as carried on in the coal fields today. Exterminate the pay-day drunks and you will have accomplished a wonderful stride in welfare work. This is a difficult job but sooner or later the question must be met and solved. There is no other industry, not even railroading, where it is more important to place restrictions on the use of intoxicants by employees than in mining. Yet what have we done as compared with many leading railroads?

FAVORABLE WORKING CONDITIONS AS IMPORTANT AS WAGES

Sixth—Labor is entitled to fair working conditions. Wages alone do not satisfy us nor any other workman. A man may be satisfactorily compensated, but if his working conditions are abnormally bad he is dissatisfied, and his discontent finally results in inefficiency.

There are times when such conditions cannot be corrected by the employer and the faithful employee is quick to recognize this and he is quite willing to make the best of it. A workman is entitled to some comfort while at work and it is gratifying to know that he is getting it. I have reference to wash-houses, bunk or eating houses, lavatories, etc. All labor is entitled to this care and as much more as capital can afford to give him.

Seventh—Safety. "Safety first," or "accident prevention," as our Vice-President Edwin Ludlow put it at our annual banquet has been our watch-word for years, but have we carried the work far enough? I do not think so. True we have first-aid corps comprising 200 men, mine-rescue corps with 119 men, a mine-rescue car, oxygen-breathing apparatus, hospitals and fire apparatus. True we have our training stations in first-aid and mine-

rescue work. We hold our fire drills; in short, we have endeavored to prepare to cope with any fire or accident that might occur; all this is necessary, but what have we done toward accident prevention? We have done much. We have our Safety Inspection, Fire and Ventilation reports and as a company we have expended large sums of money to reduce the risk of fire and accident, but I believe that this important subject still deserves more attention from each and every one of us individually.

Discipline as a Need of the Employee

Strict discipline in the mines and on the surface is absolutely essential; an enforcement of the state mine laws and the colliery rules is the prescribed duty of every mine foreman and assistant. Strict observance by the employee, of such state laws and colliery rules as now exist, is necessary for the safety of all. The employer cannot, without the active coöperation of the toilers, successfully conduct an accident-prevention movement, and unless the workers use more prudence concerning the safety of themselves and their fellow workmen there is only one alternative and that is to enact and enforce legislation compelling the individual to perform his duty.

Eighth and lastly—Some form of workman's compensation is essential to insure the worker and his family a living in case of accident. Such a compensation act will in all probability be passed in Pennsylvania by the coming legislature and it is hoped that it may be equitable to both capital and labor.

The Old Company's Club and the Panther Valley Hospital

The Lehigh Coal & Navigation Co. has and is doing a great deal to better the workers' condition although it recognizes a great deal is yet to be accomplished. During the past five years our company expended approximately $300,000 on new houses of different types, including a club house for single men. The Old Company's club house, the home of 40 bachelors, is a stride in welfare work and progressiveness that is a credit to any company. It is operated by a board of governors (company officers) practically at cost. All employees are entitled to membership, club privileges including the use of tennis courts, billiard room, reading parlors, etc. The Panther Valley hospital, built in 1909 by subscriptions from the Lehigh Coal & Navigation Co., the workers and the business men in this community, and maintained by them for several years before the state took it over, was a move in uplift work that has in all probability saved some lives to say nothing of suffering allayed to injured employees.

I will not enlarge on this point any further other than to state that our company is actively engaged in improving existing dwellings and has recently authorized a form of 99-year lease for the building of houses but will not under any circumstances permit the building of shacks on such leased ground. This action gives the workman an opportunity to secure his own home in communities where ground is not sold and the form of lease insures him against loss through future mining.

The building of modern wash-houses, oil and lamp houses, the fireproofing of engine houses, fan houses and other important structures is considered good business not only from a standpoint of economy but because it promotes the safety and comfort of our employees.

We point with pride to our fire corps, our first-aid and mine-rescue corps and the results that all have accomplished. We look forward with pleasure to our annual first-aid contest and field day and to the enthusiasm displayed in the Panther Valley baseball league. We are enthused with the results accomplished thus far in our institute schools and it is hoped that far greater results will be attained in this work during the current year.

The Lansford Beneficial Fund

There is probably not a single person in this audience that cannot vouch for the great good accomplished through the Lansford beneficial fund in operation since 1884. Since that time the employees or their beneficiaries in case of fatal accident have been paid $800,000 and the average is now approximately $60,000 per annum. Of this $400,000 of the total benefits was paid into this fund by the Lehigh Coal & Navigation Co. and the balance by its employees. In addition many of our old and faithful workers now incapacitated have been voted pensions.

In conclusion the greatest permanent good can only be accomplished in uplift work in any industrial operation if the organization as individuals coöperates to the fullest extent. It is undisputed and indisputable that a definite plan of action backed by the enthusiasm of the individuals interested is necessary in the attainment of the highest results in any great work and it is admitted that welfare for the workers or uplift of humanity is one of the great problems of the twentieth century.

Capital is now extending and undoubtedly will continue to extend to labor more and more industrial justice as the benefit of the seed already planted becomes more and more manifest.

Employees' Magazine

The October number of this periodical is now out and it is better than ever, yet as it first appeared it was eminently creditable to the Lehigh Valley Coal Co. It has 40 pages of excellent material, well edited, admirably printed and expensively illustrated. There is a large folder showing the line-up of the visitors at the third annual outing of the Lehigh Valley Coal Co.'s Social Association, a duplicate of which illustration recently appeared in Coal Age.

Perhaps only those in the publishing business can fully appreciate the labor and expense involved in the production of such an admirable quarterly.

Safety for the Public

A farmer's wife living near Seymour, Ind., lost the sight of both eyes one day recently, when the kitchen range was blown to pieces, presumably by a piece of dynamite or a cap dropped by a coal miner. The public should be safeguarded as well as the mine worker. When "Safety First" is being discussed, the need for care in handling high explosives so that the consuming public, railroad brakemen and coal draymen may not be harmed should be emphasized with due care. In fact, it is likely that the damages will be heavy on the shipping corporations, which may rightly or wrongly be accused of delivering dynamite in the coal, for a farmer's wife is not an employee of the company and there can be no contention that she accepts the hazard of the industry when she shovels coal into the cook stove.

DISCUSSION BY READERS

How to Buy Coal

A Reply to an Article by Roger W. Babson, Which Appeared in the Nov. 15 Issue of "The Saturday Evening Post"

If I should attempt to tell the readers of *The Saturday Evening Post* how to buy stocks and should advise them to tear off at random a few yards of ticker tape as a specimen of the market, wouldn't you as a financial expert, as an economist, as Roger W. Babson—wouldn't you at least be highly interested, and wouldn't you want to set matters in their true light both with the author and with his readers?

This is the frame of mind in which I find myself after reading your article in *The Saturday Evening Post* of Nov. 15, entitled, "How to Buy Coal."

The B.t.u. Method Obsolete

I confess to being a poor judge of stocks, which I attribute to the amount of time it has taken me to study the subject of coal and the science of its proper use. But then coal economy is my profession and as a fuel engineer I am taking the liberty of bringing to your attention certain matters in your otherwise excellent article on buying coal which I believe will do great harm to the advancement of fuel economy and to a better understanding of the coal-mining industry, both of which the public greatly needs. You advocate the purchase of coal on a heat-unit basis at a time when the errors and inconsistencies of this method are becoming glaringly apparent to experienced consumers and producers as well as to those fuel experts who are frank enough to acknowledge their difficulties.

I compare the heat-unit method of purchasing coal with judging the stock market by a few yards of ticker tape, because in order to buy heat units instead of tons of coal you have first got to take a sample of the coal to find out what the heat units are worth and the usual small sample of coal does not represent the intrinsic worth of the lot being sampled, any better than a small strip of ticker tape indicates the condition of the stock market as a whole.

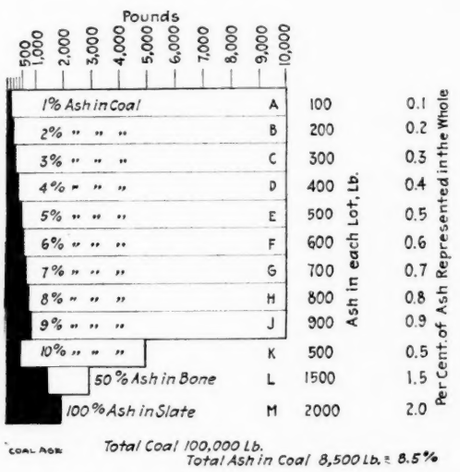
No matter how elaborate and scientific your specifications and contract may be, and no matter how good your chemist and laboratory, a sample has got to be taken for test purposes and coal sampling is proving an insurmountable obstacle to the whole proposition.

The whole trouble lies in the general idea that coal is a homogeneous substance and that in any car of coal one piece is much like another, whereas actually coal is one of the most complex substances to be found in nature. In every car of coal regardless of its grade, quality, or reputation, every piece differs slightly or greatly from every other piece, and the entire lot ranges from pieces of "pure slate" or earthy material to almost pure carbonaceous matter. Whether our coal reserves are a heritage of the people or a gift of God to a chosen few, it will always remain a most complex and variable substance. Consequently any method of purchasing or using coal will have to take these characteristics into account.

Errors in Sampling

Ash is the greatest single disturbing element in coal and consequently in anything you try to do with it. It acts primarily as a dilutant if we disregard for the present its own characteristics. As an example: An increase of 1 per cent. of ash decreases the calorific value of the coal exactly 1 per cent. and each of the constituents as shown by analysis, proportionately.

Ash causes practically all the trouble in sampling for the reason that it is not uniformly distributed. To show the effect of ash on sampling, I have drawn a "composite plot" of a car of coal, somewhat exaggerated, for purposes of illustration.



Ash Distribution in a Car of Coal

The diagram represents a 100,000-lb. or 50-ton car of coal, in which the contents have been separated into nine 10,000-lb. lots (represented by *A* to *J* inclusive on the diagram), each having an increasing percentage of ash from 1 per cent. in the first lot to 9 per cent. in the last; and three other lots, totaling 10,000 lb., consisting of 5000 lb. of coal with 10 per cent. ash, 3000 lb. of bone with 50 per cent. ash and 2000 lb. of slate of 100 per cent. ash, as indicated by *K*, *L* and *M*, respectively, on the diagram. You will note that the total amount of ash in the car is 8500 lb., which gives us 8.5 per cent. ash for the 100,000 lb. of coal in question.

It is obvious that a sample consisting entirely of coal from any one of the individual lots comprising this car will not yield the correct 8.5 per cent. of ash and that only the correct proportional amount of each lot of coal, bone and slate shown will do so. The possible combinations are, of course, infinite, and I shall not attempt to go into this phase of the subject. I wish to emphasize, however, as most important in the sampling problem, that whereas in the present illustration we have a ton of slate (all ash) and three-quarters of a ton of bone (50

per cent. ash), their effect on the entire 50 tons is to increase the ash 2 per cent. and 1½ per cent. respectively, or combined they equal 3½ per cent. These are regarded as extraneous impurities and can be plainly identified on sight. The so called extraneous impurities are mainly responsible for the incorrectness of coal analyses and are hence of more importance than the ash contained in what is considered good coal.

Possible Inaccuracies

Under actual conditions the slate and bone and all of the different lots of coal represented in the ideal diagram, are more or less intimately mixed in the car which, nevertheless, in the present case, would still have the same average, 8½ per cent. of ash.

You recommend 100 lb. for a sample from a 100-ton lot. In taking this sample you might not secure any slate or bone whatever, in which case your results would be 3½ per cent. too high, or on a good Eastern coal it would show too many b.t.u. or heat units by approximately 500, which at 4c. per hundred would mean your paying 20c. per ton more than the coal is worth. On the other hand, you might take another 100-lb. sample from the coal illustrated, which would carry, say, five pounds of slate and two pounds of bone. The five pounds of slate would mean 5 per cent. more ash and the two pounds of bone would add 1 per cent. ash, making a total of 6 per cent. more ash in the second sample than in the first and at the same time be out of correct proportion by 2½ per cent. or 350 b.t.u.; in this case at 4c. per hundred b.t.u. the coal dealer would lose 14c. per ton through no fault of his own.

The Decline of the Heat-Unit Method of Buying

I trust I have made the problem of sampling, on which hangs the accuracy of any analysis, sufficiently clear. If you apply the law of averages and the law of probabilities to sampling you will find some astounding data and if you study these laws in conjunction with the size of the pieces of coal and slate usually found in commercial coal, you will finally arrive at the conclusion that in some of the cases at least a sample of twenty or forty thousand pounds (regardless of the amount of coal being sampled) will fulfill the degree of accuracy demanded by the terms of many of the coal specifications which have been promulgated.

As you will see, from what has preceded I am not in favor of the heat-value method of buying and selling coal, and the general adoption of coal specifications in their present form, notwithstanding the fact that I helped to introduce this system six years ago and am the author of one of the series of Government bulletins referred to in the article in the *Post*.

Too much experimenting has already been done at the expense of both consumer and coal dealer and while in the beginning we knew little or nothing about the difficulties which confronted us we now know the problems fairly well and until these can be satisfactorily solved, I would advise all large consumers of coal to avoid any scheme for purchasing fuel in which payment is based on a laboratory sample. Reference is made of the railroads being able to care for themselves. None of the large railway systems are buying heat units, and they have very thoroughly investigated the method too. The U. S. Navy has been investigating American coal since 1844. No other material for ship's use is as important to this department as the fuel. This is not bought on the heat-unit specifications. The government has also discontinued this method in purchasing anthracite.

Its Adaptability to Certain Conditions

The heat-unit specification method is recommended because it is being used by the National Government, many municipalities and public institutions. This is the argument which has been used by nearly all of the method's advocates, without any consideration being given to the great difference between a private consumer and a public institution. The purchasing officers of public institutions welcomed the heat-unit basis of buying coal more as a means of reducing the number of identical bids or tenders for the contract, than as a means of holding the contractor to the specification. A public officer must avoid all suspicion of partiality or personal preference in buying supplies where a private corporation or individual would not have to do so.

I am also disappointed to find the *Post* article making the implication that the coal men and somebody else are in collusion to defraud the public. This time it is the maker of stoves.

The general design of stoves and in fact nearly all heating apparatus and boilers was developed during the period when anthracite (the first coal to be generally used in this country) was the only fuel except wood. Consequently stoves were constructed with the object not only of using anthracite but with proportions and parts suited to the *sizes* of anthracite which were economical and popular at that time. The styles haven't changed much in heating apparatus, at least they haven't kept up with the changes in the coal industry with the result that we have stoves with unsuitable grates and fireboxes, boilers set too near the grate and otherwise improperly designed and erected for the coals which are economical and popular at the present time.

Engineers and manufacturers are learning that coal-burning apparatus must be proportioned to suit a particular fuel and that the old standard designs do not fill the needs of the day. Now it remains for the public to learn more about coal and its efficient use if they truly want "conservation," for the success of coal conservation depends entirely upon finding enough people with sufficient intelligence to burn the low-grade stuff that cannot be marketed under present conditions.

J. S. Burrows.

Norfolk, Va.

The Costs and Profits in Coal Mining

A Reply to the Recent Paper of Edward H. Parker

The article of Edward H. Parker, entitled "The Costs and Profits in Coal Mining," which appeared in your valued Coal Age of Nov. 1, is a masterpiece of wit and humor, and places Mr. Parker, at once, safely in the front rank of American humorists.

Seldom is one given the opportunity for such a real, good, side-splitting laugh as Mr. Parker affords us in his comic description of the frantic efforts of the anthracite coal roads to keep out of the toils of the sheriff, or the despoiling hands of a receivership. His paper read exactly as though the author had changed places and be-

come the statistician of the anthracite coal combine instead of the Geological Survey of the United States Government.

There was a time when it was thought safe to assume that the statistics and data collected and compiled by Uncle Sam's various departments at Washington were sufficiently near the truth to be more or less reliable, but if Mr. Parker's report is a sample of the way they do business at present, then the government is worse than wasting its money, for it is using it apparently to serve the purpose of those who seek to evade the ends of justice.

Mr. Parker says: "The anthracite-coal roads are only making 20c. a ton profit." Isn't that a pity? Won't someone be good enough to call McReynolds and the rest of his bloodhounds off the trail of the poor, persecuted coal roads that are striving so hard to keep body and soul together, for it is a crime to so continually harass them in their benevolent efforts to keep the country's industries moving and our homes warm and comfortable in the depths of winter.

A Matter of Bookkeeping

It is an open secret that the coal roads, to hide their profits, have for many years juggled their books in order to show that the coal department was owing money to the transportation department and therefore was a losing proposition, and they are foolish enough to continue that game, thinking that by so doing, they can fool the people.

If they are clearing only 20c. per ton now, where in the name of common sense were they coming out before they tacked on that last 25c. a ton?

It is difficult to believe that Mr. Parker is in earnest when he makes that astounding claim, but if he is, then we deplore his ignorance of the subject on which he attempts to enlighten us; however, if he knows better and is simply permitting himself to be used as a tool by the anthracite-coal roads in their efforts to befuddle the public and deceive the government, he is more to be pitied than censured; in any event President Wilson should see to it that the service of the Geological Survey is bettered by the appointment of someone who does know what he is talking about.

Dollar a Ton Profit

Many, many years ago the profit was admittedly a dollar a ton on anthracite coal when nothing below pea coal was marketable, but when buckwheat, rice and barley became of value the profit on anthracite increased.

Mr. Parker's article cites the total value of royalties paid as $7,969,785, and the total production as 72,215,273 long tons, then the average royalty paid is only 11.36c. per ton, surely that is cheap enough to suit the most fastidious when it is borne in mind that there are properties in the anthracite regions where the royalty runs up to more than 80c. per ton on prepared sizes, while 50 and 60c. royalties are numerous. The tendency is decidedly upward, and why is this so? Simply because there is so much profit in anthracite coal that the companies are falling over one another in their endeavors to add to their holdings of fuel lands.

Let Mr. Parker come into the anthracite-coal field and seek to lighten the burden of the operators by buying their lands, and he will soon find that the proverbial hen's teeth are not in it for scarcity as compared with coal holdings that are for sale. Of course, there are some properties being offered, but their owners are making so much money out of them that they have placed their asking prices so high as to make them absolutely prohibitive.

For instance, I know of a property that contains probably 5,000,000 tons of merchantable coal, and is quite an ordinary property at that. It is producing 400,000 tons per annum for the present owners, who are estimated to have made 25 or 30 million dollars, practically all from the coal business. These people are asking three million dollars for the property above mentioned, which figures up at the rate of 60c. per ton for coal in the ground, besides which there is a royalty of 25c. per ton to be added, because the property is not in fee, but is a leasehold.

However, as the 25c. is for prepared sizes, we must be fair and make the average royalty on all sizes only about 18c. per ton, but even at that, the price asked for this property, all told, would be $3,900,000. The breaker and surface improvements on this property can be duplicated for less than $250,000, and this is by no means an exception, yet we are asked to believe Mr. Parker's story of the impending bankruptcy of the coal roads.

Something about Transportation Charges

If Mr. Parker is anxious to know the actual facts, then let him come into this field and we will show him pretty near to the last cent just what they are making, and it runs all the way from $1 per ton to as high as $1.75, and in a few cases to over $2 per ton. To this must be added the profits of the railroad that charges 35 per cent. of the tide-water price for hauling the coal, or $1.75 per ton when the tide-water price is $5 per ton, for carrying coal say 135 miles to Hoboken, as the D., L. & W. R.R. does. This same road charges only 75c. per ton, for other commodities that cost a great deal more to handle.

We will take great pleasure in showing Mr. Parker where the "Coal Roads" are washing culm banks for 7 to 10c. per ton, while their selling price in the New York wholesale markets, as quoted by Coal Age, Nov. 1, is buckwheat, $2.75; rice, $2.25; and barley, $1.75.

Does any sane man believe that these coal roads would hug so closely to their bosoms their vast holdings of anthracite-coal lands and continue to wax richer and stronger as the years go by on a measly profit of only 25c. per ton? We, in the anthracite field, know just what coal costs to mine and prepare. We also know at first hand what we are talking about when we say that Mr. Parker is off in his calculations.

If the anthracite-coal roads are not making as much money as they should, and we all know that, as compared with the earnings of the individual operators, they are not, then there is a reason for it and that reason is not to be sought for very far.

Let the stockholders take a little more interest in the management and conduct of their properties and they will be astonished at what they find, for there are tales that could be told that would make the big fellows down in New York turn green with envy and feel like pikers at the pointers that some of their understrappers, here in the coal fields, could give them in the art of making money at someone else's expense.

T. Ellsworth Davies,
Mining Engineer and Geologist.
Scranton, Penn.

Working Coal under Sandstone Cover

Letter No. 3—Replying to the inquiries of Mr. Anderson and West Virginia Engineer, COAL AGE, Nov. 15, p. 745, I want to say that, in my experience, it is not possible to give a hard-and-fast rule in respect to the drawing of pillars. The conditions in the mine should be thoroughly studied before work of this kind is begun, so as to adopt a plan that will suit the existing conditions.

In the case cited by Mr. Anderson, my plan would be to attack the pillars now standing with as large a force as could be handled to advantage. The work of drawing back the pillars should be pushed as rapidly as possible and every precaution taken to induce a fall of roof in the abandoned area.

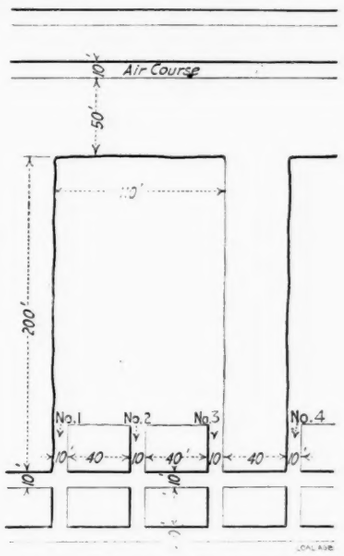
In the future work in this mine, I should prefer to draw the pillars in regular order as the workings advance. In drawing pillars from a large area, the danger of a squeeze always increases with the length of time in which the work is executed. I recall one instance when I was able to break the cover a vertical distance of 300 ft. by excavating a space about 300 ft. square. The break extended to the surface. A borehole record, in that case, showed the cover to consist of alternating sandstones and shales, one single stratum of sandstone being 60 ft. thick.

If Mr. Anderson does not know what size of territory it is necessary to excavate, to break his roof, I would suggest that he start and draw the pillars back in six of the inside rooms, continuing the work to the entry stumps or the point where the rooms are widened out. This would provide a space 300 ft. square, which in my opinion would be sufficient to cause a break.

I am basing this suggestion upon a former experience of mine, in drawing back the pillars in a 6-ft. seam of coal, where the headroom had been reduced to 5 ft., by the squeeze. The bottom was soft and, like Mr. Anderson's, the coal was overlaid with a very strong sandstone roof. Little attempt was made to save the timbers, although we succeeded in saving some. After the first break occurred there was no further trouble, the roof falling behind us as the pillars were drawn back. In this instance, the break occurred at times before we had excavated more than 100 ft. square. The squeeze was checked and finally stopped. We recovered 90 per cent. of the coal.

I feel the plan that I have described would also answer the purpose of West Virginia Engineer. I want to say that it would be well to give careful attention to the article on Retreating Longwall Mining Methods, COAL AGE, Nov. 15, p. 722, as this is a subject of vital importance to all mining men.

For the past three years, I have been employing a method that may be of interest in this connection. It is a system of modified longwall, the conditions being such as to permit of its adoption. The mine is laid out on the panel system. Cross or butt entries were driven every 300 ft., the entry and its air course being driven on 40-ft. centers. The rooms, also, are turned on 50-ft. centers and driven a distance of 200 ft., so as to leave a 50-ft. barrier pillar between the head of the rooms and the next air course. The rooms were driven 10 ft. wide for a distance of 30 ft., and were then widened out as follows: Room 1 was widened, say, to the right; room 2, widened both to the right and left; and room 3, widened to the left only. As shown in the accompanying figure, no pillars were left between these rooms. The same plan was followed in regard to rooms 4, 5 and 6, and this was continued throughout the length of the entry. A 40-ft. pillar was, thus, left between each set of three rooms. This plan gave a working face 110 ft. long, in each case, and made a distance of about 170 ft. to go. When the rooms reached the limit, the work of drawing back the 40-ft. pillars, separating each set of rooms, was commenced, and the roof fell regularly as this work progressed. The seam was 42 in. in thickness, and the roof conditions varied from sandstone to shale, the latter having a thickness varying from a few inches to 4 ft.



A SYSTEM OF WORKING COAL UNDER A HARD ROOF WHEN THE BOTTOM IS SOFT

The reason that led to the adoption of this system was the need to remedy the trouble we were having in getting miners to handle their cars in and out of the rooms, and to enable the gathering motors to work more efficiently. A track was laid up the first room in each set, and extended across the face of the longwall. The motor placed six cars at a trip. The section of track across the face was shifted forward as the face advanced. Not only was the efficiency of the locomotives increased, but the system required the laying of a less number of frogs and switches. No attempt was made to pull timbers when advancing; but, in retreating, such timbers as could be drawn safely were taken out and saved. As each pair of entries reached the limit or boundary, the room stumps, entry and barrier pillars were drawn.

I do not advise the adoption of this method in general, but only as conditions may permit. It served well in the case mentioned.

G. M. SHOEMAKER.

Pennington Gap, Va.

[The above is but one of a number of letters that have been received in response to this interesting question. The letters all bear evidence of coming from practical men who realize the difficulty of being able to make a large extraction of coal under the conditions named, unless ample provision has been made, in the first working, for the safe and economical extraction of the pillars.

We hope to be able to publish all the letters in the order in which they have been received, as each one presents some practical suggestion of its own.—ED.]

The Certificate Law

Letter No. 4—In my opinion, the question of the certification of mine foremen and firebosses is one of the important problems in mining today. There is a great difference in examining boards. A man may make 90 per cent. at an examination today, for a first- or second-class certificate; and, later, he may not be able to make 60 per cent., at another examination before another board.

Another hardship is that when a man has gotten a certificate in one state, as for example, in Indiana, that certificate is only good in that one state; and to obtain a position in another state, he must pass another examination in that state also. I believe that when a man has studied mining and understands the theory and principles of mining and has sufficient practical experience, he should be able to take a mine foreman's position, in any state.

In England, in order to qualify for a certificate, a man must show that he has both practical and technical knowledge; and, if he passes the examination, he is given a certificate of competency that will enable him to take a position in any state in England or Wales.

In this connection, I would like to refer to another point. In most of the mines in Indiana, there are what are called "room bosses" and assistant mine bosses. Inasmuch as these extra bosses must often look after work of removing dangers reported by the fireboss, I believe it is important that they should hold a fireboss certificate.

JOHN SUTTON.

West Terre Haute, Ind.

[The chief mine inspector of Indiana, Mr. Pearce, stated recently that it was not necessary for a man having a certificate from Illinois to pass the examination in Indiana; but, on presentation of this certificate, he would be granted a like certificate in Indiana.—EDITOR.]

Classification of Mines

I note an interesting item in COAL AGE, Nov. 22, p. 789, to the effect that Governor Hatfield and Earl A. Henry, chief of the Department of Mines in West Virginia, are considering a classification of the mines of the state into "nonhazardous," "hazardous" and "extra-hazardous." I have seen many mines that would properly belong to the two last named classes, but I am anxious to see a mine that would come under the first head. If they are successful in completing such a classification, I am going to make a special trip to see a mine of the first class, designated as "nonhazardous."

SIM C. REYNOLDS.

Houston, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

ELECTRICITY AND MAGNETISM

It is useless to attempt to define "electricity" further than to say the term refers to a powerful physical agency that is manifested by many observed attractions and repulsions of matter; the production of light and heat, and numerous actual and assumed molecular and chemical changes that matter undergoes for which there is no explanation other than that afforded by the suggested theories of electricity and magnetism.

Natural Magnetism—A certain species of iron ore (Fe_3O_4) that is widely distributed in the earth possesses the property of strongly attracting to itself iron particles, which fact has given it the names "magnetite," "magnetic iron ore" or "loadstone," as it is often called. This mineral constitutes the "natural magnet," in distinction from artificial magnets made by magnetizing iron or steel. The magnetism of the loadstone is imparted gradually to iron or steel with which it is in contact for a time.

The earth itself is often spoken of as a "natural magnet," because of the attraction it exerts on the magnetic needle and other magnetized bodies.

Magnetization—As early as 600 B.C., it was observed that when amber was rubbed on silk it would attract light bodies. The same effect was observed by Newton, in 1675, in regard to glass rubbed with silk. Iron and steel are magnetized by long contact with a magnet, or more quickly by rubbing the metal with the same, observing the precaution, however, of continuing to rub in one direction only, the reason for which will be better understood later. It is possible, also, to magnetize a rod of soft iron by holding it in a position parallel to the earth's axis and tapping its end.

Permanent Magnets—The only really permanent magnets are the natural magnets. All artificial magnets lose much of their magnetism with the lapse of time. Soft iron is more easily magnetized than hard steel, but loses its power more quickly, highly tempered steel magnets being much more permanent.

Structure of the Magnet—The first conception of magnetic force led to the propounding of the "molecular theory of magnetism," which has since been replaced by the "electron theory." In either case, however, the magnetized body is assumed to consist of minute material particles; and whether these are "molecules" or "electrons," the reasoning is the same. Each separate particle has a magnetism of its own or is capable of being magnetized; and the magnetism of the entire body is the algebraic sum, so to speak, or the combined magnetism of the particles.

Each individual particle is thus assumed to be a magnet and subject to the same laws that control the greater magnet. Under this assumed hypothesis, the magnetization of a bar of iron, for example, depends only on the little individual magnets arranging themselves similarly in uniform lines parallel to each other and to the general axis of the larger magnet.

The Coal Age Pocket Book

Polarity, Polarization—Whatever the underlying cause that produces magnetism, the first chief effect is to create two widely different and opposite conditions that manifest themselves most strongly in the two ends of the magnetized bar; and what is true of the bar is assumed to be true of each individual particle of which the bar is composed.

The two ends of a magnetized bar, thus possessing opposite qualities are termed the "poles" of the magnet. One is said to be the "positive pole" and the other the "negative pole." The direct effect of magnetization is, therefore, to create "polarity" in the body magnetized; or, as we say, produce "polarization." The latter term, however, has another more specific meaning, referring to the creation of counter or opposing electrical forces.

Evidences of Polarity—When a magnetized bar is brought into contact with iron filings, the latter cling in two great bunches to the ends of the bar as shown in Fig. 1, while no filings attach themselves to the center of the bar. The

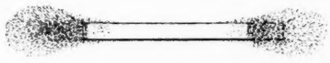


FIG. 1. SHOWING ATTRACTION OF A BAR MAGNET FOR IRON FILINGS

FIG. 2. ILLUSTRATING THE MOLECULAR CONDITION IN A MAGNETIZED BAR

experiment shows that the bar possesses free magnetism which is strongest at its two ends or poles, the center of the bar being neutral and having no attractive force.

That the polarity of the two ends of a magnetized bar is different in kind is clearly shown by approaching either end of the bar, successively to the two poles of a magnetized needle mounted on a pivot and free to swing in a horizontal plane. The bar will attract one pole of the needle, but repel the other. If now the opposite end of the bar be approached to the needle it will be found to attract that pole which the other repelled, and to repel the one previously attracted.

An Experiment—To show that the entire bar is magnetized equally throughout and not the ends alone, it is only necessary to cut the bar in the center or at any point of its length, and each of the parts will be found to possess polarity, in the same manner and to the same degree, as did the ends of the original bar. This leads to the conclusion, which is in line with and supports the previous assumption; namely, that the magnetized bar is, in fact, an aggregation of an infinite number of magnetized particles, as illustrated in a greatly magnified manner, in Fig. 2. These particles are represented, in the figure, as having one dark and one light end, to indicate the different polarity of each. The attractive forces are thus largely balanced, except at the two ends of the bar, which present opposite polarities, as previously stated.

INQUIRIES OF GENERAL INTEREST

Corrosion of Iron Pipes in Mines

We have been very much troubled by the corrosion of the pipes connected with the pumping system, in our mines. The mine water is quite acid and eats away the pipes rapidly. I know, of course, that this is a common trouble in every coal mine, more or less. We have tried different ways of protecting the pipes, but with little success.

Can you suggest any effective means of preventing this corrosion? The replacing of the corroded pipes is an item of considerable expense, which we are naturally desirous to avoid if possible. Perhaps, some of the readers of COAL AGE have had similar experience and can suggest a remedy that will reduce or eliminate the trouble.

MINE SUPERINTENDENT.

Oskaloosa, Iowa.

Without going into unnecessary detail in explanation of the corrosion of iron, it may be stated briefly, that there is always a tendency to chemical reaction taking place between oxygen and iron, in the presence of moisture. The first step in the reaction is to form a lower or ferrous oxide of iron (FeO). In this stage, the oxygen of the water unites with the iron and hydrogen is set free. The ferrous oxide then combines with the water to form a more highly oxidized ferric hydrate or ferric hydroxide, $Fe(HO)_3$. This action takes place to a greater or less extent in pure water containing no acid, and is greatly accelerated by the action of the air. The latter oxidizes the iron, which is precipitated as ferric hydroxide. When acid is contained in the water, however, it attacks the iron and the action is greatly accelerated.

As a result of this reaction, there is set up an electric current, which passes from the iron into the electrolyte. It is this electric current that carries away and destroys the iron. It has been assumed that if this current could be opposed by a counter-current, the destructive action or corrosion of the iron would be retarded to the extent that the current was neutralized by the counter-current.

To produce such a counter-current, it was reasoned that there should be immersed in the same liquid, a metal having a higher "solution tension" than the iron or one that would cause a counter-current to flow from the metal to the iron when the circuit was completed. In practice, it has been found that the same result can be accomplished by passing an electric current generated in a battery or dynamo through the liquid, using any suitable anode, as carbon immersed in the liquid. The current passing from this anode through the liquid to the iron opposes and destroys the electric current previously mentioned, which would otherwise destroy the iron.

A number of experiments have proven that the strength of current required to produce the desired results depends on several factors; chiefly, the aëration of the water or the amount of air it contained; the more or less rapid motion of the water by which fresh surfaces of contact are exposed to the iron; and the amount of acid in the water or the strength of the acid solution. A comparatively low voltage, say from three to five volts, can be used, depending on the distance the anode is from the iron or the space the electric current must traverse in the water.

In this connection, an interesting paper has been prepared by J. K. Clement and L. V. Walker, of the Bureau of Mines (Technical paper No. 15), in which reference is made to a previous paper on the corrosion of iron and steel presented by G. Harker, to the Sydney (Australia) Section of the Society of Chemical Industry. In that paper, it is stated that Mr. Harker has devised a method of calculating the strength of current required to prevent corrosion of the iron, from the loss in weight of the iron, under any given conditions. The subject is one of great interest and we shall be glad to receive further suggestions or information and to learn of the experience of others, in the same line.

The Use of the Anemometer

In the use of the anemometer, should the instrument be held so that the air current will strike the face of the dial, or should it be held with its back toward the air? Of course, in the former case, when the air strikes the face of the dial, the dial hands run backward; but I have seen some mine foremen, who claim that this makes no difference, just so the true reading of the dial be taken before and after exposing the instrument to the current. They claim that the lesser reading subtracted from the greater will always give the correct result, whether the instrument be held in one position or the other. Kindly advise if this is correct.

MINE MANAGER.

Pittsburgh, Penn.

In the calibration of an anemometer, the instrument is always arranged to run forward. The air strikes the back of the instrument in this case. In practice, if the anemometer is held in a position so that the air current strikes the dial face, the air glances from the dials onto the blades, with the result that a higher reading is obtained than the actual. For this reason, the instrument should always be held so that the air strikes the back of the vanes. The observer should stand at the side of the entry, facing the opposite rib, and hold the instrument at arm's length with its back toward the air. Any other position will give a slightly incorrect reading.

It is also claimed by some that the anemometer cannot give a greater reading than the actual. This statement is very incorrect, as a perfect instrument is adjusted to a certain normal speed, as stated in COAL AGE, Nov. 1, p. 655, which should approximate the average speed of the currents in which the instrument is intended to be used. As stated on p. 655, higher velocities than this will give readings in excess of the actual, while the readings for lower velocities must be increased. The chart given previously will be found useful whenever the instrument is used in very weak or strong currents.

EXAMINATION QUESTIONS

Miscellaneous Questions

(*Answered by Request*)

Ques.—What is an element, in chemistry?

Ans.—An element is any simple substance composed wholly of like matter. For example, hydrogen, nitrogen, carbon, etc., are each elements.

Ques.—Describe what is meant by a chemical compound and state how it differs from a mechanical mixture.

Ans.—A chemical compound is composed of two or more elements chemically united or combined to form a new substance that differs in its qualities from any of its constituent elements.

A chemical compound differs from a mechanical mixture in the fact that its constituents always combine in fixed proportions, while a mechanical mixture is composed of two or more ingredients mixed together in varying quantities. While the chemical compound has always a fixed composition and its properties do not vary, a mechanical mixture has no fixed composition, and its properties or qualities vary with the degree of the mixture.

Carbon dioxide, which is composed of one atom of carbon, combined with two atoms of oxygen, is a chemical compound. On the other hand, air, which is composed of a mixture of nitrogen and oxygen gases, is a mechanical mixture because the nitrogen and oxygen are not chemically united. Although the proportion of nitrogen and oxygen in the free air of the atmosphere is quite constant, the purity of mine air often varies considerably with the depletion of the oxygen that occurs in the workings.

Ques.—What are the resultant gases in the air of a mine after an explosion of gas and coal dust?

Ans.—The afterdamp of an explosion of gas and dust will depend largely on the quantity of air present before the explosion, as well as the quantity of gas and dust present and the size of the workings. If sufficient air is present to produce the complete combustion of both the gas and the dust, the chief products of the explosion will be carbon dioxide (CO_2), nitrogen (N_2) and water vapor (H_2O). If, however, the quantity of air present is not sufficient for the complete combustion of the gas and dust, there will result a varying quantity of carbon monoxide (CO) mixed with the water vapor, nitrogen and carbon dioxide. Under certain conditions there will remain some unburned methane or marsh gas (CH_4), and often some nitrous oxide gas (N_2O) and free hydrogen (H_2).

Ques.—What is the composition of bituminous, semibituminous and anthracite coals, respectively.

Ans.—The distinguishing characteristic between these three classes or grades of coal is the relative percentage of fixed carbon and volatile matter they contain. There is no distinct line of demarkation shown by analyses. The bituminous coals contain an average of, say 35 per cent. of volatile combustible matter, and, perhaps, 55 per cent. of fixed carbon, with varying percentages of moisture and ash. Anthracite, on the other hand, generally contains from 80 to 85 per cent. of fixed carbon and less than 5 per cent. of volatile matter, with a somewhat larger percentage of moisture and ash than is true of the bituminous coal. Semibituminous is a grade of coal midway between the bituminous and anthracite. There is also a grade known as semianthracite, which comes between the semibituminous and the anthracite. The two grades last mentioned are distinguished more by their physical qualities than by any difference in their chemical composition.

Ques.—The belt-wheel on a dynamo is 2 ft. in diameter and runs at a speed of 600 r.p.m.; the belt-wheel on the engine is 14.5 ft. in diameter; at what speed must the engine run to develop the required speed in the dynamo?

Ans.—The number of revolutions per minute of two pulleys connected by a belt is inversely proportional to the diameters of the pulleys. In other words, the speed ratio is equal to the inverse diameter ratio of the belt-wheels. Then, calling the required speed of the engine x:

$$\frac{x}{600} = \frac{2}{14.5} = 0.138$$

$$x = 600 \times 0.138 = 82.8 \text{ } r.p.m.$$

Ques.—How would you open and close the valves that start and stop an engine; as slowly or as quickly as possible? Give reasons.

Ans.—One great danger of opening the throttle of a hoisting engine too quickly is the strain that would be thrown on the hoisting rope, by the sudden starting of the engine. In general, there is always danger of opening the throttle of an engine too quickly, owing to the possible presence of water of condensation in the cylinder or steam line, which might cause the breakage of the cylinder head, unless the water could escape quickly enough from the drip cocks. After a short idleness, or when the cylinder is comparatively cool, the engine should always be started slowly, with the drip cocks open. For these reasons, the throttle of an engine should always be opened and closed with some caution; never suddenly.

Ques.—Define the term "forward pressure;" and state, also, what is meant by "back pressure."

Ans.—When speaking of a steam engine, the term "forward pressure" refers to the pressure on the piston that causes it to move forward. It is the steam-cylinder pressure behind the piston and which drives the piston from one end of the cylinder to the other. The term "back pressure" refers to the pressure in front of the piston and opposing its motion. It is due to the resistance offered by the exhaust ports of the cylinder. In order to reduce the back pressure in a steam cylinder, the exhaust ports should be sufficiently large to permit of the rapid escape of the exhaust steam. The back pressure in the steam cylinder of a noncondensing engine will vary from practically nothing to 4 or 5 lb. per sq.in. If it rises above this amount, something is probably wrong with the engine and should be remedied at once.

COAL AND COKE NEWS

Washington, D. C.

While the Senate is working on the currency measure and other bills that have been assigned precedence, the House of Representatives has agreed to take up the bill for a Government railroad in Alaska designed to open up the coal and other mining resources of the territory and prevent their becoming a monopoly in private hands. On Nov. 29, Representative Houston, for the Committee on Territories, filed a report in which he said:

More than one-half of the unsold public domain of the United States lies in Alaska. All the naval coal on lands of the United States is in Alaska. The purpose of the bill is clearly stated in section 1 to be to locate and build a line or lines of standard-gage railroad in the Territory of Alaska, to be so located as to connect one or more of the open Pacific Ocean harbors on the southern coast with the navigable waters in the interior of Alaska, and with the coal field or fields yielding coal sufficient in quality and quantity for naval use, so as best to aid in the development of the agricultural and mineral or other resources of Alaska, and the settlement of the public lands therein, and so as to provide transportation of coal for the Army and Navy, of troops, arms, munitions of war, of the mails, and for other government and public uses.

These are all governmental uses and are the uses and purposes which have always been thought to justify the United States in aiding in the construction of railroads in the South and West by donations of land grants.

There is little coal in California, some low-grade coal in Oregon, and a better grade in Washington. But the only naval coal on the Pacific coast of America is in Alaska.

The bill is justified by the commerce clause of the Constitution. The Panama Canal is thought to be justified by the power "to provide for the common defense and general welfare" of the United States, and both equally justify and authorize the construction of an Alaska coal-carrying railroad to supply our Navy with coal at a strategic point between the Orient and the United States.

Coal for the Panama Canal

The question of coal facilities for vessels in the canal trade is attracting considerable attention from foreign writers and authorities and inquiry is being made of governmental authorities as to their attitude and policy in the matter. Secretary Garrison, in answer to an inquiry, has lately given utterances that the War Department will provide the necessary facilities to deliver coal at the lowest possible rates if, by so doing, traffic will be attracted to the Panama Canal away from alternative routes.

The Government in September, 1911, appointed a special commissioner to report, among other points, on the question of bunker costs on alternative routes, and determine a price at which bunkers would be delivered on the canal in competition therewith. Although, as far as can be at present ascertained, the future policy is not definitely settled, it is stated on good authority that it is the intention of the authorities to establish coaling facilities in the shape of high-speed bunkering apparatus, and be prepared to supply bunker coal at a figure which will yield a fair commercial profit.

The coaling stations at San Francisco, Seattle and Vancouver will in the near future bear about the same relation to the Panama Canal route to the Orietn that the Mediterranean coaling stations bear to the route from Europe via Suez. Vessels leaving the Mediterranean for the East take on board enough bunkers at the Suez Canal for the long run from Port Said to Colombo, or even Singapore; likewise, vessels leaving San Francisco or Puget Sound take sufficient bunkers for the voyage across the North Pacific to Japan, the distances being practically the same.

If in the future the price of coal at San Francisco can be fixed as low as at Port Said the use of the Panama Canal will be greatly aided, and if a regular or increasing tonnage can be relied upon, coal supplies on the Pacific coast will doubtless take the necessary steps to foster the trade by providing special facilities to insure quick dispatch, and by fixing the prices at a level which will insure shipowners directng their tonnage via the Panama Canal to the Orient.

An Interesting Decision

The Supreme Court of the United States handed down on Dec. 1, the decision in the case of Stratton's Independence, Ltd., the important mining case which was certified to the Court from the United States Circuit Court of Appeals for the purpose of ascertaining whether mining concerns are warranted in charging certain things to depreciation and whether they are subject to the corporation tax on the basis that has heretofore been required.

Stratton's Independence, Ltd., in its contest in the lower courts practically put before the judicial authorities three distinct questions as embodying the points at issue. They were as follows:

1. Does the corporation tax law actually apply to mining corporations in the same sense that it applies to others having a "net revenue" from operation?
2. Are the proceeds of ores mined by a corporation on its own premises an "income" in the sense in which that term is used under the law?
3. Supposing that such proceeds are to be regarded as income, is not the corporation entitled to deduct from its gross revenue the value of such ore in its place before being mined as a depreciation under the corporation tax?

In answering these questions the Supreme Court renders the following responses:

1. Mining corporations are not different from other concerns in the application of the law.
2. The proceeds of ore sales resulting from mining operations conducted on a corporation's own premises are income just as is the case with any other income.
3. The value of the ore before being mined cannot be regarded as depreciation and treated as such.

The decision in its final form will not be available for some days. It is regarded as of great importance inasmuch as it gives to the Government the proceeds of the corporation tax upon all companies which mine ore or coal, this being otherwise lost if the contentions of the corporation had been upheld. Much of the argument in the case is likely to be regarded as furnishing a precedent in other cases involving similar issues under the corporation tax act.

HARRISBURG, PENN.

Fourteen municipalities, in addition to Philadelphia and Pittsburgh, have organized evening industrial schools under the auspices of the State Education Department, who have been establishing vocational schools under the provisions of the act of 1913.

In the anthracite region, such schools have been established in Shamokin, Nanticoke, Wanamine, Glen Lyon, Shickshinny, Nesquehoning, Wiconisco, Lykens and Williamstown boroughs and Coal Township, Ellsworth and Cokeburg in the bituminous region, these schools being for mine workers. Wilkes-Barre and Williamsport will maintain evening schools for machine trades. The work in Philadelphia and Pittsburgh is for men of many industries.

Officers of the State Board of Education say the evening schools in the coal regions have been successful and that more will be opened.

Underground Hospitals Are Established

Practically all of the coal companies in the anthracite region have complied with the provision of the mine law, which requires that hospitals be erected and maintained in the mines. They have gone a step farther at some collieries and equipped the temporary institutions with such medical supplies as are necessary, at the same time providing all the "first-aid" appliances in order that the pain of the men injured may be allayed in the shortest possible time.

Not only have the hospitals been provided in the interior of the mines, but some of the companies have also erected substantial places on the exterior, which will afford shelter and accommodations for the injured.

The spirit manifested by the coal companies is appreciated by the men, as it affords opportunity of saving many lives which heretofore have been sacrificed because of the absence of remedies at first hand.

The Court Grants a Mandamus

The court has granted a mandamus on the mine inspectors' examining board of the district that covers Schuylkill, Columbia, Northumberland and Dauphin Counties, to show cause why they should not issue a certificate of competency to Thomas C. Reese, of Pottsville, a former mine official, who took the examination before the board last spring, but was refused a certificate.

The proceedings against the board are the result of oft-repeated charges that the law giving the people in the anthracite region the right to elect mine inspectors is made a farce, so far as the southern part of the field is concerned, because

of the "remarkable coincidence" that, regardless of how many candidates take the examination, only as many certificates are issued as there are places to be filled. Last spring Mine Inspector M. J. Brennan, who has held the office for many years, was the candidate who was given the exclusive certificate. This left the people with no choice, but to elect without opposition the party given a certificate by the board. The members of the board are John H. Pollard, chairman, Mahanoy City; Jacob Britton, Pottsville; James Bache, Locustdale; David J. Davis, Pottsville, and Pilate Orme, St. Clair.

Reese declares that the questions and answers filed in the department of mines at Harrisburg will show that he answered correctly 90 per cent. of the questions asked by the board.

He also declares in his petition that a certain periodical in referring to newspaper criticisms of the board for giving a certificate to only one candidate, admitted that another candidate passed with a grade of 90 per cent., but it declared the reason for this was that "this man had not been able to obtain a position of trust at any anthracite mine in the region for more than ten years, the reason being that he was superintendent in 1898 of a mine where six men met an untimely death in one accident due to his mismanagement."

Reese declares he is the man referred to, and that he will prove at the hearing before the court that this information was furnished by members of the board. The case will be heard in about two weeks.

Coal Assessment Again in Litigation

Litigation over coal assessments in Luzerne County is again stirred up, this time by the Delaware, Lackawanna & Western R.R., to test the legality of the new assessment, the company claiming that the county assessors fixed $9000 as the value of an acre of coal in Wilkes-Barre, and that they used these figures as an arbitrary basis for the assessment of all coal lands in the county.

There is now pending a suit instituted by the county commissioners to determine whether taxes paid under the old valuation were justifiable and the coal companies have a suit against the increase made by the new board of assessors.

The litigation involved in these three suits will eventually find its way to the Supreme Court. That body has already passed upon various features of the controversy, and has said that the assessment value of an acre of coal land must be the value which the land would bring at a bona fide sale. But the difficulty is that there are differences of opinion as to what is a bona fide sale. A great amount of testimony has been taken to show that the value set by the coal companies, or paid by them for individual tracts, is not the actual market value.

PENNSYLVANIA

Anthracite

Nanticoke—The figures recently issued by the Delaware, Lackawanna & Western Coal Co. regarding the output of coal at the Truesdale Colliery at Nanticoke were remarkable, but later investigation shows that the credit for the record output should go to the Prospect Colliery of the Lehigh Valley Coal Co. During the month of October, 108,220 tons of coal were prepared at the Truesdale breaker. Of this amount, 105,020 tons were shipped to market. This means an average daily shipment of 4040 tons for the 26 working days.

During last month, the Lehigh Valley Prospect breaker prepared 115,755 tons of coal. Of this amount 11,080 tons were sent to the boiler plants. This means that the Truesdale sent more coal to the market, but that the Prospect leads in the amount that passed through the breaker. During the 26 working days at the Prospect, 4452 tons were prepared daily. It is estimated that the production from these two breakers alone will be well over 2,000,000 tons for the year.

Gilberton—The Philadelphia & Reading Coal & Iron Co.'s Gilberton colliery, which has been idle several months for the building of a new breaker, resumed operations recently.

Ashland—The Whippoorwill No. 2 slope; operated by the Reading Coal & Iron Co., was flooded to near the mouth this week. Workmen, driving the south tunnel in the Primrose vein, noticed a superabundance of water and caution was used, but following an explosion water rushed in with such rapidity as to endanger the lives of a great number of the men.

Scranton—The Scranton School Board has received notice from the Clearview Coal Co. that operations will be begun immediately to mine the coal under school No. 40. This is a brick structure, one of the newest and finest in the city.

Manager Dawson, of the Clearview Co., said that miners are working not 500 ft. from the school. The veins lie close to the surface at this point, and if the coal is removed from beneath, there will probably be a settling. The school contains about 800 pupils.

Bituminous

Pittsburgh—A verdict of $7348.64 was recently returned by a jury in favor of the C. Jutte Co. against the Monongahela River Consolidated Coal & Coke Co. The Jutte Co. in 1904 leased property from Harry S. McKinley and later it was acquired by the Monongahela River Co. The buildings burned down and McKinley after suit was given a verdict against the Jutte Co., which then sued the Monongahela Co. for the amount of the verdict.

Washington—The property of the Washington County Coal Co., in Crosscreek and Jefferson townships, has been purchased by John A. Bell for a consideration of $165,000. This property includes 808 acres of coal and 8048 acres of surface underlain with coal, and the equipment of the company.

Punxsutawney—Between 800 and 900 miners employed by the Clearfield Bituminous Coal Corporation at its Rossiter operation resumed work recently, after a strike which began Oct. 22. The miners decided to accept the decision of arbitrators and resumed work voluntarily.

Indiana—There is a persistent rumor here that the Pennsylvania R.R. is preparing to open and work some 5000 acres of virgin coal land located in Blacklick and Conemaugh townships in the near future.

WEST VIRGINIA

Beckley—One of the largest deeds admitted to record for many months has just been copied in the deed book. This document conveys some 57 tracts of land embraced in Raleigh and Wyoming counties from the Pocahontas Coal & Coke Co. to the Norfolk & Western R.R. Co. This area embraces some of the finest land in this section.

Williamson—E. B. Lambert and M. J. Riblett have sold the Mattie May coal operation near Lenore to R. L. Martin, of Pittsburgh. A company to be called the Washed Coal Co. will be organized and extensive improvements made to the plant. The old owners operated under the name of the Big Block Coal Co.

Charleston—Coal operators report some improvement in the supply of cars on the Chesapeake & Ohio R.R. during the past few days. It is not known whether this improvement was the result of the action of the operators in complaining to the management of the road, or was due to natural causes. Unless the conditions continue to improve it is said that the operators may resort to the courts for further relief.

KENTUCKY

Fleming—Construction work has been started on a second and third mining city in close proximity to this town, by the Mineral Fuel Co., one on Potters Fork to be designated, Haymond, and another on Yount's Fork to be reached by a two-mile branch of the Lexington & Eastern R.R., construction of which is to start Dec. 1. The work is to be rushed with all possible haste and the road completed ready to carry coal within three months.

Whitesburg—The Elkhorn Coal Corp. composed largely of New York, Baltimore and Philadelphia capitalists and of which John C. C. Mayo, Paintsville, Ky. and C. Bascom Slemp, of the Ninth Virginia district are the head, is beginning the initial work of a big coal development in the Lower Boone's Fork coal fields above here on the new extension of the Lexington & Eastern R.R. There will be at least ten mine openings, while the buildings will consist of at least two good-sized industrial mining cities smlar to Jenkns and McRoberts which have been built by the Consolidation Coal Co.

OHIO

Columbus—A mine-rescue car is being made for the Ohio Industrial Commission by a Chicago firm. It will contain all life-saving equipment needed when mine explosions occur. The specifications for the car were prepared by J. C. Davies, head of the mine-inspection department. The Legislature appropriated $10,000 for the purchase of a car and its maintenance for two years. The car will be kept on a siding in Columbus, in constant readiness for a call from any part of the state. It will be attached to a passenger train when it is to be sent out.

Coal operators in all parts of Ohio are again complaining of the labor shortage which is causing them considerable trouble. This is especially true in the Hocking Valley and eastern Ohio districts. It is the rule among the miners that on the least excuse they quit work for the day and the operator has no recourse.

INDIANA

Linton—The Linton field is beginning to suffer from the congestion of cars loaded and empty at this point and between here and Latta. There are said to be 600 cars of coal on side-tracks between these points. The Linton yards are almost blockaded. The Illinois Central handles almost all the coal from the Southeastern Indiana road, taking most of it through Indianapolis, instead of Terre Haute as formerly. The Illinois Central is said to be short of motive power, mainly on account of the long strike of shopmen which caused the repairing of equipment to fall behind.

Princeton—The disagreement that caused fourteen machine miners to walk out at the Princeton mine has been adjusted and the mine is in operation again.

Arrangements are projected for opening several coal mines along the Southern Ry. east of this city. Local promoters have taken leases on more than 8000 acres between here and Francisco. These men have hopes of obtaining options on a block of 20,000 acres as many other leases are promised. If these plans succeed there will be many developments during the next year.

ILLINOIS

Madison—The Illinois Central Railway Co. has started surveying for its new storage yards and round-house east of this place. It is understood that the yards will have forty-seven miles of storage tracks, which will be used chiefly for commercial merchandise, enabling this road to turn over to the coal traffic department its present facilities at East St. Louis. It will take something like two years to put these yards in shape.

Herrin—The boiler and engine room of the Oak Ridge mine of the Southern Illinois Coal & Coke Co. was partly destroyed by fire, entailing a loss of something like $5000. The fire originated from defective electric wiring, and operations will be suspended for about two weeks.

Murphysboro—The past month has been a record breaker in the production of Big Muddy coal. The Harrison and No. 9 of the Big Muddy Coal & Iron Co. of St. Louis broke their records by hoisting over 45,000 tons in November. This is the largest tonnage that has ever been produced in one month in this field by these mines, which produce over nine-tenths of all the Big Muddy coal mined.

COLORADO

Pueblo—An attempt to procure a monopoly of labor is charged in indictments returned by the Federal Grand Jury against J. P. White, president, Frank J. Hayes, vice-president, and William Green, secretary-treasurer of the United Mine Workers of America. This is said to be the first indictment of a labor union under the Sherman law. The jury's report further says: "The methods pursued by the mine workers to force recognition of their union by the operators are an insult to conservative and law-abiding labor. They have armed hundreds of irresponsible aliens who have become a menace even to the lives of citizens. They have created open insurrection."

OREGON

Portland—In conjunction with the Douglas Fir Co., just organized in Portland by C. H. Gibson and G. W. McNear & Co., to operate a line of vessels between Portland and Australia, it has been announced that Gibson and McNear and Andrew Weir have organized the Petroleum Products Co., for the handling of case oil to the Antipodes. The first two steamers of the line are the British steamships "Lord Sefton" and "Rothley," which are owned by Weir. The steamers are now on their way from Australia with coal. Large coal bunkers will be built in Portland Harbor by this firm to coal its ships, the balance of the coal will be sold to local buyers.

Douglas County—The filings made in the United States Land Office at Roseburg a short time ago on 5000 acres of coal lands by capitalists has caused considerable excitement in that section. The land is situated 15 miles east of Glide and 30 miles east of Roseburg and comprises a vein of anthracite coal 12 ft. thick. This is the first discovery of anthracite coal made in Oregon. Twenty-four locations were made and more will follow. The value of the vein is said to be well proven.

FOREIGN NEWS

The Seattle Chamber of Commerce has posted a bulletin stating that Capt. Nelson, of the schooner "C. G. Hill," has discovered what he believes to be a valuable deposit of anthracite coal along the Knik River at the northeastern corner of Cook's Inlet on the south-central coast of Alaska.

PERSONALS

Governor Dunne, of Illinois has appointed J. W. Starks, of Georgetown, inspector for the 5th District, to succeed W. S. Burris, resigned.

Gov. Tener has appointed Dr. Chas. M. Bordner, of Shenandoah, Penn., to be trustee of the Ashland State Hospital which was founded largely to take care of those injured in mining accidents.

Patrick J. Tormay, superintendent of the Trotter plant of the H. C. Frick Coke Co., and one of the oldest employees of this concern, has concluded 25 years of service and retired from active duty.

Frank Tirre has just returned from Laramie, Wyo., having resigned the general managership of the Northern Colorado Coal & Coke Co. Mr. Tirre will give his attention to his mining properties at Lenzburg, Ill.

John Oliphant, for many years president of the Harris Air Pump Co., Indianapolis, Ind., has joined the engineering staff of the Sullivan Machinery Co. and will have charge of its pneumatic pumping department.

W. E. Borders has sold out his interest in the Borders Coal Co.'s mine at Marissa, to the remaining stockholders, who have arranged with the Rutledge & Taylor Coal Company, of St. Louis to handle the tonnage.

R. E. Sheppard, a well known operator of Weir City, Kan., has mysteriously disappeared with $10,000, and friends of the coal man fear that he has met with foul play. Mr. Sheppard, when last seen, had left Pittsburg, Kan., for the mine at Weir City with the weekly payroll.

Thomas J. Gibson, a miner, who exhibited courage at Cokedale, Colo., in February, 1910, and who was awarded a Carnegie medal and a reward of $1000 at that time, has returned to Mulberry, Kan., to claim the money. Following the Cokedale affair, when Gibson rescued two miners who had been suffocated, he disappeared, and only recently was located, after working in West Virginia and Iowa.

RECENT COAL AND COKE PATENTS

Smoke Jack. J. B. Fox, Chicago, Ill. 1,070,420, Aug. 19, 1913. Filed May 17, 1913. Serial No. 768,369.

Smoke and Fume Recorder. W. W. Strong, Mechanicsburg, Penn. 1,071,532, Aug. 26, 1913. Filed Jan. 6, 1912. Serial No. 669,847.

Smoke Consumer. C. A. Schofield and C. F. Miller, Washington, D. C. 1,070,543, Aug. 19, 1913. Filed June 13, 1910. Serial No. 566,678.

Superheater for Water Tube Boiler—W. Schmidt and P. Thomsen, Wilhelmshohe, Germany, 1,073,934, Sept. 23, 1913. Filed Feb. 7, 1910, Serial No. 542,595.

Furnace for Burning Bituminous Coal. W. McClave, assignor to McClave-Brooks Co., Scranton, Penn. 1,071,166, Aug. 26, 1913. Filed Mar. 24, 1913. Serial No. 756,453.

CONSTRUCTION NEWS

Milwaukee, Wis.—The Youghiogheny & Ohio Coal Co. expects to spend about half a million of dollars in the construction of new coal docks at Milwaukee in the near future.

Hamilton, Ohio—Engineers are surveying a site for the construction of a new round house and coal elevator for the C. H. & D. Ry. at Hamilton, Ohio. Work will be started soon.

Charleroi, Penn.—John Werton, of Roscoe has taken a contract for building a number of small dwelling houses for the striking miners at Benbeau mine, near Centerville. The miners for whom these houses are to be erected have been living in tents.

Washington, D. C.—Immediate construction at San Francisco of a coal storage plant of from 200,000 to 300,000 tons capacity, to meet fuel demands of the navy when the Panama Canal is opened, is recommended by Paymaster General T. J. Cowles, of the navy in his annual report, which has just been made public. The Paymaster General thinks the proposed

plant should be so located that it can be readily doubled and so constructed that it can receive both water and rail shipments. "The increased mobility of the fleet," he says, "makes increased storage facilities at this point absolutely imperative."

Jeannette, Penn.—The Composition Coke Fuel Co. will erect a plant here to make a new fuel which is said to possess the virtues of both coal and coke, with the faults of neither.

Crystal, W. Va.—The Crystal Coal & Coke Co. will install in its station at Mora, W. Va., a 300-kw. rotary converter and switchboard, which has been ordered from the General Electric Co.

Dayton, Ohio—The W. P. Rice Mining Co. has closed a contract with the Morrow Manufacturing Co., of Wellston, Ohio, for a complete modern screening and coal-handling plant for their new mine at Palos, Ohio.

NEW INCORPORATIONS

Hiawatha, W. Va.—The Ennis Coal Co. has been incorporated with $150,000 capital stock to develop coal lands.

Birmingham, Ala.—The West Pratt Coal Mining Corporation has been incorporated with a capital stock of $100,000 to develop coal lands.

Tacoma, Wash.—The Roslyn Coal & Coke Co. has been incorporated with a capital of $50,000. A. F. Plant, and Geo. H. Reed, are the principal incorporators.

Indianapolis, Ind.—The Ellis-Moss Coal Co. has been incorporated here, with $5000 capital stock, to deal in coal. The directors are J. H. Ellis, J. Moss and J. C. Anderson.

Nashville, Tenn.—The charter of the Kimberly Mining & Mfg. Co., of Knox County, has been amended so that the name of the company is changed to the Kimberly Coal Co.

Cleveland, Ohio—The North Fork Coal Co., of Cleveland, Ohio has been incorporated, with a capital stock of $150,000, to mine and deal in coal. The incorporators are J. J. Roby, Charles F. Benson, E. B. Thomas, E. Kantrovich and E. G. Hoag.

Lexington, Ky.—The Lynn Hollow Coal & Coke Co., recently organized at Harlan, has increased its capital stock from $50,000 to $100,000. This firm expects to make a number of increases and extensions immediately after the first of the coming year.

Murray City, Ohio—The North Hocking Coal Co., of Murray City, Ohio, has been incorporated, with a capital stock of $10,000, to mine and deal in coal. The incorporators are M. M. Kasler, Velina Kasler, C. E. Campbell, Earl Campbell and T. B. Angle.

Dover, Del.—A certificate of increase in capital stock has been filed in the State Department for the Emerald Coal & Coke Co., of Pittsburgh, Penn., increasing from $1,000,000 to $2,000,000. The company was first chartered here Aug. 14, 1908, with Julian Kennedy, W. H. Henderson and R. D. Crawford, all of Pittsburgh, as incorporators, the business being to acquire coal deposits and manufacture coke.

INDUSTRIAL NEWS

Toronto, Ont.—The Toronto branch of the Canadian H. W. Johns-Manville Co., Ltd., has removed to 19 Front St., East.

Uniontown, Penn.—T. J. Cromble, of Charleroi, recently purchased four acres of coal from Mrs. H. R. Tuman, of Fallowfield Township, for $4000.

Akron, Ohio—Several Akron men are interested in the Albright Smokeless Coal Co. which was organized recently at Kingwood, W. V., with a capital of $850,000.

Lexington, Ky.—The Henry Coal & Coke Co. recently organized at Winchester, Ky., after purchasing several thousand acres of rich coal lands in Perry County has made the announcement that it will soon start development.

Whitesburg, Ky.—The Lexington & Eastern Railroad Co. is locating a five-mile branch railroad from Colson up Camp Branch Creek near here which is to reach extensive coal lands of the Rockhouse Coal Co. A rich timber district would also be opened up.

Petersburg, Ind.—Martin & Miley, coal operators, are still leasing coal land south of here and will soon have enough leases to begin testing out their holdings. The Bicknell Coal Co., of Bicknell has leased 1500 acres west of here. They are moving their core drills for the first test.

Meyersdale, Penn.—The Keystone Coal Co., which took over the old Ajax mine near Coal Run is now operating it as Elk Lick mine No. 4, and shipping on an average two cars of coal per day. This firm is also making a new opening on the small vein of the old Chapman Mine to be known as Elk Lick No. 5.

Minot, N. D.—The owners of the lignite briquetting plant that is being established here have predicted that lignite coal briquettes will be sold in Minot at $10 a ton, which is about 25 per cent. cheaper than anthracite coal is now sold here. It is admitted, however, that this price may be changed somewhat after the plant is placed in operation.

Uniontown, Penn.—One of the biggest coal deals in this county was recently consummated when 48 Green County residents conveyed 5500 acres of coal lands to the Youngstown Sheet & Tube Co. The land varied in value from $625 to $700 per acre, and it is understood that the purchase price was about $3,000,000, payable in from 3 to 10 years.

South Bethlehem, Penn.—It is reported that the Lehigh & New England R.R. has leased the Panther Creek R.R., a 32-mile line between Tamaqua and Nesquehoning. There are nearly a dozen colleries in the Panther Creek Valley which mine anthracite. The whole output will now be transported to tide water over the lines of the Lehigh & New England.

Detroit, Mich.—The American Blower Co. has purchased the entire air washer interests including patent rights of the McCreery Engineering Co. formerly of Toledo, and later of Detroit. The McCreery purifying, cooling and humidifying equipment will hereafter be exclusively manufactured and sold by the American Blower Co. under the trademark "Sirocco."

Columbus, Ohio—Dealers in coal throughout Ohio profess to see a great help in the Hite Good Roads Law, which was recently declared constitutional by the Ohio Supreme Court. The law provides for $5,000,000 yearly for five years for road improvement. When this money is spent, it is believed that the retail coal business in the rural districts will be on a more solid basis.

Toledo, Ohio—Toledo has contracted for its winter supply of coal the contracts being divided between the West-Crescent Fuel Co., the Toledo Fuel Co., and the Big Four Coal Co. The contract price for anthracite was $3.50 a ton, and the soft coal ranged from $2.45@2.95 a ton. Fifty bushels of egg anthracite for the pest house went to the Big Four Coal Co., at $7 per ton.

Ashtabula, Ohio—Navigation all the year around is promised to Ashtabula Harbor as a result of a decision to install a gyroscope on the car ferry which plies between Ashtabula Harbor and Port Burwell, Ontario. A successful test with a gyroscope was made recently. It is claimed that such a device will obviate all the difficulties attendant upon an attempt to sail through the ice.

Nanticoke, Penn.—Merchants are alarmed over mine caves which threaten to destroy several buildings in the central part of the city, and the flooding of cellars due to the breaking of the water mains, caused by the settling. There are cracks as deep as 12 ft. between the buildings and sidewalks for a distance of several hundred feet. The section is undermined by the Susquehanna Coal Co.

Twin Falls, Idaho—What is believed to be the largest lump of coal ever mined and shipped is now reposing in front of a retail dealer's at Twin Falls, Idaho. The lump lacks but 100 lb. of weighing two and a half tons. It is of the King Lump variety, and was taken from a mine in Utah. It required no little trouble and figuring to remove it from the freight car to a dray when received here.

Lorain, Ohio—A contract has been closed by officials of the American Shipbuilding Co. in Cleveland for the construction of a 9000-ton steel freighter to be built at the Lorain yards of the company and to be delivered May 1, 1914. The new boat is being constructed by Pittsburgh capitalists, and is to be a duplicate of the steamer "Quincy A. Shaw," of the Hanna fleet built in 1911. The vessel will be of the "Isherwood" system of construction, 520 ft. over all, 504-ft. keel, 54-ft. beam and 30-ft. draft.

Smithfield, Penn.—Work has been started by Torrington & Boude, contractors, of Philadelphia, on three miles of railroad for the Baltimore & Ohio near Smithfield, Penn. which will open up a large acreage of coal in the direction of Masontown. The new spur starts about 1½ miles from Smithfield and runs to the 300 acre tract of the Republic Iron and Steel Co., at Botwood, where they are opening a new mine. The contractors expect to have the road completed by spring. The mine will be a drift operation. No ovens will be built; the product will be taken to Youngstown plant where it will be coked.

COAL TRADE REVIEWS

GENERAL REVIEW

Unseasonable weather the controlling feature in both anthracite and bituminous. Hard coal dull but with prices well maintained. Bituminous business confined to contracts. Stocks accumulating. Further softening inevitable unless there is a change in weather conditions.

The anthracite demand and production are well balanced, but the trade lacks the snap of ten days ago, and has failed entirely to show the activity customary at this period of the year. Both dealers and operators are complaining. However, the heavy rush of coal at the closing of the lake trade last week, some shippers temporarily cutting off their all-rail business entirely, had a stimulating effect upon the situation; anthracite shipments to the Northwest by way of the lakes will run a full million tons, or about 25 per cent. ahead of last year's tonnage.

Uniform reports of unseasonably warm weather from all parts of the country is the feature of the bituminous situation. There is practically no call for spot coal, and business is steadily falling off; the demand on contract is still good, and prices in both instances are being fairly well maintained, operators showing a disposition to restrict production rather than shade quotations. However, there is a great deal of free coal accumulating at some points, stocks generally are plentiful, and a further softening is inevitable unless there is an appreciable change for the better in weather conditions.

The market in the Pittsburgh district has reached a point where a great many operators have closed down until the situation clears up some. The mild weather, the closing of the lake shipping, and the curtailment in steel business has made quotations irregular, but not so soft as was anticipated; it is believed that the slowing up in manufacturing has been more or less discounted. As a rule, consumers appear to be well supplied, and are simply waiting developments, while the operators are undoubtedly becoming anxious and occasional low prices are noted where it becomes necessary to force the market with some free coal.

The almost unprecedented weather conditions have also been felt in the Ohio markets, the trade there having been maintained better than in other districts. Prices are still holding moderately well, particularly on certain grades, but the previous strength has clearly given away to softness, and the circular cannot be held much longer unless there is some cold weather. Dumpings at Hampton Roads continue fairly heavy with no apparent change in quotations, and a moderate shortage still in effect. The demand in the South is light but with the circular being firmly held.

A general curtailment in operation is noticeable in the Middlewest, operators showing a disposition to reduce the working schedule rather than make any further price concession. Weather conditions are relatively the same as in the East, with the result that domestic consumption is reduced to practically nothing. Manufacturing demand is at about the average or less.

EASTERN MARKET

BOSTON, MASS.

Bituminous trade quiet. The continued absence of inquiry for spot coal and a decrease in off-shore business tends to soften the market. Georges Creek continues in ample supply, price remaining firm. Pennsylvanias are weaker. Anthracite strong with a continued and increasing scarcity of stove coal.

Bituminous—The market in general continues inactive with a slight tendency to soften. The extreme caution of the shippers over the amount of contract business they would take last spring, together with a decrease in the past week of the off-shore demand, has resulted in an accumulation of coal at Hampton Roads with an excess of chartered tonnage. Furthermore, the well stocked condition of New England consumers has eliminated any inquiry for spot coal. However, contract demand remains normal and for New River and Pocahontas the circular f.o.b. price of $2.85 per ton is well maintained.

Georges Creek is continuing to move regularly on contract with the usual supply at the piers and prices firm.

The large output of the Pennsylvanias, weather conditions and the abundance of water power, as well as the fact that the stocks of coal all over New England appear to be above normal, indicate a further softening of the market for these coals.

Anthracite—The market continues strong with an ever-increasing scarcity of stove coal, and there is a strong possibility for a pinch in that size should the weather come out cold. During this past week's mild weather the retail market has been inactive. Transportation continues regular and although the supply of unchartered vessels has increased, rates remain firm.

Quotations on bituminous are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahonta New River
Mines*	$1.00@1.55	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.25@2.75	2.50@2.85	2.92@3.02	
New York*	2.55@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.85@2.90
Boston†				3.72@3.82
Providence†				3.72@3.87

*F.o.b. †On cars.

NEW YORK

Hard coal lacks its characteristic snap but no surpluses are accumulating. Shortage expected. Bituminous getting steadily worse, and there is now little spot business.

Anthracite—While the demand for anthracite coal equals production the snap and action present a week or ten days ago has gone. At present broken coal is going as usual on contract and little or no outside demand. Egg coal is dull and odd lots are to be had at a concession from circular. Stove is still the short size, but premiums are not offered as freely as was the case ten days ago. Chestnut is active and not very plentiful. Pea coal is in good demand on the line, but dull at tide with no occasion to send it here. Buckwheat, rice and barley in the better qualities are all short while the poorer grades are a drug on the market at low figures.

Dealers in all sections complain of dull business; a weather market prevails and while anticipating a shortage in case of cold weather, consumers refuse to pay any fancy figures until compelled by actual need to do so.

We quote the New York market, with the circular on the prepared sizes 10c. higher and pea coal 5c. higher, the new advance announced this week, the market now being:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.10	.....	$5.05	
Egg	5.35	$5.00@5.25	5.30	$5.00@5.20
Stove	5.35	5.25@5.50	5.30	5.20@5.45
Chestnut	5.60	5.50	5.55	5.35@5.45
Pea	3.55	3.50	3.50	3.45
Buckwheat	2.75	2.60@2.75	2.45@2.70	2.25@2.70
Rice	2.25	2.15@2.25	1.95@2.20	1.80@2.20
Barley	1.75	1.60@1.75	1.70	1.40@1.70

Bituminous conditions are getting constantly worse, the demand for spot coal being reduced to virtually nothing. Where shippers could keep going largely on contract business they now have stocks accumulated to such an extent that they are compelled to go into the market and seek extra business and it is taking cut prices to secure it. With general business constantly falling off on the one hand and an increased supply of labor and cars on the other, it is hard to tell where the large volume of production gets to, but the fact remains that there is a heavy tonnage moving.

Numerous foreign Church holidays from now to April, however, will counteract any expected increase during that period but the present outlook does not indicate any further material shortage either of cars or labor.

The market is rather dull and weak on the following basis:

West Virginia steam, $2.65@2.75; fair grades of Pennsylvania, $2.75@2.85; good grades of Pennsylvania, $2.85@2.95; best Miller Pennsylvania, $3.15@3.25; George's Creek, $3.20@3.30.

PHILADELPHIA, PENN.

Unsatisfactory weather conditions still confront trade. Activity centered in certain grades. Operating companies announce advance and retailers follow with increase to the consumer.

Anthracite—While the anthracite trade revived somewhat during the past week, the market still lacks the vigor that should characterize it at this period of the year. Dealers and operators are both complaining because of the lack of new orders. Stove and chestnut remain the favored grades. Slight concessions are being made on egg, the only slow size. This concession is offset, however, by a premium which individual operators are getting on stove coal.

As was expected some action was taken last week by many of the local retail dealers to make the consumer pay the state tax of 2½%. Two of the largest operating companies, since the tax went into effect, have levied the additional charge but the others continued to absorb it. Nevertheless the retailers, confronted with unfavorable conditions, decided to charge, starting Dec. 1, an additional 25c. on each ton. Some other dealers have increased the charge 15 cents.

In letters sent to the trade, bearing the date of Dec. 1, the operating companies announce that they have made an advance of 10c. on broken, egg, stove and chestnut and 5c. on pea. While no mention is made of the state tax it is presumed that the additional charge is to cover the 2½% levy.

Bituminous—In the bituminous market conditions still remain unsatisfactory. There has been a decided falling off in orders and a softening of prices, which indicates that there is a slowing down in the manufacturing world. The market for spot coal is thin and soft; the better grades are holding fairly firm, good Pennsylvania coals being quoted at $1.35@1.40. These figures represent very little recession from the highest prices obtained last August at the height of the trade. The car supply is plentiful and the movement free.

The local hard-coal market is now quotable as follows:

	Line and City Trade		Tidewater	
	Circular	Individual	Circular	Individual
Broken	$3 50	$3.50	$4.75	$4.85
Egg	3.75	3.70@3.75	5.00	5.00
Stove	4.00	4.20@4.30	5.00	5.00
Chestnut	4.15	4.15	5.25	5.25
Pea	2.50	2.50	....	....
Buckwheat	1.50	1.50	....	....

BALTIMORE, MD.

Market still weak. West Virginia gas fuels further off because of closing of Lakes. Anthracite hit by the continued warm weather.

A review of the situation here in bituminous coal shows that the entire market is soft. The closing of the Lake season has also hit the gas-coal market; prices have continued to shade off for three-quarter West Virginia gas coals until they are purchasable at as low as 95c. and $1. The general market, however, is from five to ten cents above these emergency sales.

The Pennsylvania steam-coal situation is in a little better shape and while the lower grades can be had down to $1, the better grades, such as Quemahoning, are holding firm at around $1.35, mine basis. The coke market continues weak, sales being regulated largely on what can be secured.

Along anthracite lines there is little of interest, except that the market is a poor one. Unseasonably warm weather has effected the small-order trade adversely. The smaller yards in the retail trade are feeling this most keenly.

Exports are showing a slight improvement. Several charters for European and South American account were closed during the week.

BUFFALO, N. Y.

Too much bituminous in consumers' hands and they are indifferent to the market. Closing Lake trade. Rush to get anthracite afloat.

Bituminous—There is a light demand for anything in bituminous. While prices have not broken badly, the consumers seem to think that they have enough for the present and are holding off to see what will happen. It is claimed that Pittsburgh grades are holding pretty firm, with the belief that as soon as the Lakes are closed and there is a new channel for coal going that way, the market will be firmer.

It may happen that the decline in consumption is due to the weather, and if so there will be business enough for everybody soon. Cars are fairly plentiful, which is not favorable to firm prices. A month ago the trade was almost entirely held up by car shortage. It is not so now and it will not be so again till there is snow to hinder the movement. Slack is hard to dispose of. Consumers hear that there will be a lot of it thrown on the market when the Lakes close and they talk of getting it at 50c. a ton. Still there are so many contracts in force that the mines are kept pretty busy at going prices and it may be that the regular Pittsburgh quotations will hold till the winter trade is ready to take up the surplus. Operators will look for that and are planning accordingly.

Meanwhile the jobber is encouraged; he did little while the operator could sell all his coal direct, but now he is asked if he cannot sell a few cars somewhere. Coal sells at good paying prices and if it does not break badly before winter is here, the year will be a profitable one.

Bituminous quotations remain weak at $2.90 for Pittsburgh lump, $2.80 for three-quarter, $2.65 for mine-run and $2.25 for slack, with Allegheny Valley coal about 25c. lower.

Coke—There are conflicting reports in the coke trade, some shippers finding it weak and others seeing a stronger tendency developing; one shipper was able to sell a car at a price a few cents above the regular market. Quotations remain at $4.70 for 72-hr. Connellsville foundry.

Anthracite—There is all haste to get as much anthracite afloat as possible, some shipping agents shutting off their rail-line business till the last vessel is gone. December will see a fair amount shpiped, but not nearly as much as would go if the vessels could get insurance at summer rates. An effort to advance rates to $1 a ton was repudiated, though it may be that a cargo or two will get the rate. The great storm cut off shipments materially. Shipments for the week were 99,900 tons; for November, 515,500 tons, and for the season, 4,920,196 tons, as against 3,856,683 tons to December last season.

The local anthracite trade is quiet, but as heavy as shippers care to have it at present. It is noted that several shippers, independents as well as others, are making the Pennsylvania tax a regular price, without calling it a tax, though certain representatives of independent mines still insist that the tax is a dead letter and will be thrown out by the courts.

CENTRAL STATES

PITTSBURGH, PENN.

Many mines closed this week, production suddenly dropping to about 60%; car and labor supply ample. Prices down to regular season level and not overly firm. Competition for Connellsville coke contracts, with lower prices, but little buying.

Bituminous—The mines ran almost full last week, but Saturday many of them closed until a clearer insight into the future could be secured, making this week's production not over about 60% of capacity. In addition to the stopping of lake shipments the weather has been unusually mild and a serious curtailment in operations in the steel industry, a very important customer of the Pittsburgh coal district, has occurred. It appears, however, that while the steel mills are not running at over 60% of capacity the shops that use steel are doing considerably better, stocks of steel being drawn upon.

Prices have become somewhat irregular, but on the whole there is not as much softness as was predicted in some quarters for this period. The advanced list promulgated in October has been lost entirely, and the regular quoting basis is now the same as earlier in the year, with departures in some instances. Slack is holding quite well as the production of screened coal is limited. Whether the market loses more ground in the next 30 days will, it is claimed, depend largely upon weather conditions. In prices and production the slowing up in manufacturing demand is believed to have been fairly well discounted. Regular quotations are the same as those of early in the year: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district. Car supply is ample and men are ready to work.

Connellsville Coke—Several operators have shown themselves more ready to book contracts for 1914 furnace coke than was expected. They have, in a measure, been endeavoring to close contracts before consumers were ready and rumors are that some relatively low prices have been named, down to $1.75 but the rumors are not fully confirmed. At most only a few operators are participating in the present competition. Spot demand is very light. Unless consmuers elect to buy from hand to mouth there will be a heavy turnover in contract furnace coke in the next 30 days, despite the reduced rate of operation among blast furnaces, since all the annual and semi-annual contracts expire Dec. 31, as well as several longer term contracts, so that practically the entire merchant coke output is to be disposed of by one form of sale or another. We quote: Prompt furnace, $1.85@1.90 contract, $1.90@2; prompt foundry, $2.50@2.75; contract foundry, $2.50, per ton at oven.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Nov. 29 at 335,240 tons, an increase of 19,078 tons, and shipments at 378,904 tons, an increase of 20,385 tons.

TOLEDO, OHIO

Unprecedented warm weather causing the market to drag. Prices holding moderately firm. Certain kinds of equipment is scarce.

The demand for coal here is slow as a result of the continued warm weather, which is almost unprecedented and has hit the coal men rather hard. However, a few cold days would result in a big business, according to the consensus of opinion among coal dealers here. On the other hand, the open season is giving railroads a better chance to get caught up and get their equipment in shape to better handle the rush when it does come. Cars are scarce and hundreds of them are still being held in the Michigan beet fields. There are plenty of hoppers but dealers are reluctant to take them and never do unless compelled by a crowding demand. Flat-bottom cars are scarce and the railroads are away behind their orders. Shipments from the mines are coming in slowly. Prices are being well maintained as nobody looks on the situation from a pessimistic standpoint, the market being altogether a weather proposition.

COLUMBUS, OHIO

Softness has succeeded to the stringency in the Ohio trade. There is a falling off in the demand for all grades and prices have weakened. Warmer weather of the past few weeks is the cause.

A radical change has taken place in the Ohio trade, due to the higher temperatures which have prevailed for the past few weeks. Softness has succeeded strength and the demand for all grades is falling off to a certain extent. Prices have slumped although every effort is being made by operators and shippers to maintain the circular figures of recent date. So far the cutting has been only in a few spots but unless the weather turns colder it will be a difficult matter to maintain quotations.

One of the best features is the improvement in the car supply. But this is believed to be only temporary and due largely to the decreased demand and better movement of trains. In the Hocking Valley the output is estimated at 65% and the same is reported from the Pomeroy Bend district. In the domestic fields the output is even larger; in Eastern Ohio it is reported at 60% of the average.

Domestic demand suffered the most from the warm spell; all grades were weak and dealers were inclined to either cancel or delay shipments on their orders. Dealers' stocks are fairly large and in many cases they have been unable to take care of the incoming cars. Then again many of the hopper cars are being used and these are not wanted by many retailers. Retail trade is practically nil at this time owing to the warm weather and most of the larger domestic users have laid in their supply of fuel; prices show weakness all along the line, but there is a good demand for Pocahontas, West Virginia splints and anthracite.

The lake trade is rapidly fading and only a few cargoes are scheduled to leave the lower lake ports after the first of December. Steam business is becoming weak in sympathy with domestic grades. Many of the iron and steel plants which were large consumers of coal have shut down and as a result the tonnage consumed is less. Railroads are taking a good volume as their freight movement is considerable. Some speculation is heard as to what figures will be written in coming steam contracts because of the uncertainties of the mining rate and the mine-run bill. A number of steam contracts expire about the first of the year.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$2.00 @ 1.85	.....	$2.25 @ 2.15	$2.00 @ 1.85
3-4 inch	1.80 @ 1.70	$1.40 @ 1.30	2.00 @ 1.90	1.80 @ 1.65
Nut	1.30 @ 1.20	.....	1.75 @ 1.65	1.30 @ 1.25
Mine-run	1.40 @ 1.35	1.25 @ 1.15	1.50 @ 1.40	1.40 @ 1.30
Nut, pea and slack	0.95 @ 0.90	.....	1.00 @ 0.90	0.90 @ 0.85
Coarse slack	0.85 @ 0.80	1.00 @ 0.95	0.90 @ 0.80	0.80 @ 0.75

DETROIT, MICH.

Market quiet but moderately steady. Car supply improved.

Bituminous—Orders in the immediate vicinity of Detroit seem to be picking up in a small way but are not heavy. This is due to the fact that considerable storage prior to this time has protected the outside manufacturer against any unforeseen rush. There has been several cars of domestic fuel standing on track but it has all been disposed of at a fair margin of profit. No demurrage accrued on any of it. Hocking lump has now advanced to $2.25 and West Virginia lump for domestic purposes is quoted at from $1.75@2 per ton and is in fair supply.

There is every indication for an early rise before the first of the year. Transportation facilities have improved quite noticeably during the past few days, and operators are experiencing practically no difficulty in transportation except in some cases where the supply is dependent on one road.

The market is quotable as follows:

	W. Va. Splint	Gas	Hocking	No. 8	Cambridge	Jackson Hill	Pocahontas	Pomeroy
Domestic lump	$2.00	.....	$2.25	.....	.....	$2.50	$3.00	$1.80
Egg	2.00	.....	2.25	.....	.....	2.50	3.00	1.80
Nut	1.40	.....	1.75	.....	.....	.....	.....	.....
Steam lump	1.60	.....	.....	.....	.....	.....	.....	.....
¾ lump	1.35	$1.50	1.50	$1.50	$1.50	.....	.....	.....
Mine run	1.25	1.25	1.25	1.25	1.25	.....	1.60	.....
Slack	1.00	1.00	1.00	1.00	1.00	.....	.....	1.00

Anthracite—Stove size is not as plentiful as has been in the last two weeks and local concerns are willingly paying a premium of 50c. per ton on all they can procure for immediate shipment. Egg size is not so abundant as might be at this time; however it is selling at the circular. In a few cases chestnut has brought as high as $1 per ton above circular and very little can be had for immediate shipment.

Coke—Connellsville coke is not in great demand, and is now being quoted freely as low as $1.75 f.o.b. ovens. Semet Solvay remains at $3 and gashouse at $2.85.

HAMPTON ROADS, VA.

Dumpings for the week fairly heavy. Shortage still continues at all piers with little prospect of improvement. Virginian will again break its record for heavy dumpings.

While dumpings have been good from Sewalls Point piers the other roads appear to have fallen down somewhat in their loadings. The movement as a whole, however, from Hampton Roads has been fairly heavy. Shipments to New England as usual have taken the lead and there has also been some fair movement foreign with one or two small cargoes going to the Southern ports.

Prices on all coal from tidewater have remained practically the same as they have been for some ten days or more with a good demand for New River and Pocahontas. There has, however, been little call for the high volatile fuels.

There is still a shortage at tidewater with little prospects of conditions improving for some time to come. Several of the large Government colliers are to be loaded in December and these together with the tonnage already contracted for will leave little if any free coal for some time.

As predicted the Virginian Ry. at Sewalls Point has again broken its record for month's dumpings. While actual figures are not yet obtainable it is known their dumpings will run considerably over 325,000 tons for November. In addition to the movement of mine-run coal to the New England market during the week, one large cargo of nut and slack was shipped from Hampton Roads for Boston.

LOUISVILLE, KY.

Abnormally mild weather depressing the market. Car shortage helping the situation some.

At a season when raw and wintry weather might reasonably be expected, the temperatures have been mild with only an occasional cloudy or rainy day, so that it has been a weather market with conditions unfavorable to producers.

Not unnaturally, the market has gone off badly during the past week, following something of a slump both in demand and prices the week before; in consequence, there have been price concessions offered by many operators, and occasionally accepted by thrifty dealers. About the only thing that prevented a serious break was the fact that a somewhat extensive car shortage developed last week, many mines being idle two or three days by reason of the failure of the railroads to place rolling stock.

Eastern Kentucky block is selling at $2@2.25, which is well below offerings earlier in the season; lump can be had at $1.85@2, round at $1.60@1.75, and the better grades of nut and slack at 70 to 80c., second grades being plentiful at 50 to 60 cents.

SOUTHERN AND MIDDLEWESTERN

BIRMINGHAM, ALA.

Practically no change in either steam or domestic coal. Market continues quiet, though prices seem to be holding up. Coke market is still off. Pig iron very quiet, though furnaces holding to $11.50 basis 2 foundry. Railroad equipment still short of requirements.

This week has shown little change in either steam or domestic coal over last week. The demand still continues on a small tonnage basis, though none of the operators are inclined to cut prices. The coke market shows no improvement, inquiries being for only small amounts, though like coal, the manufacturers are demanding their price and not soliciting business at low prices. Blacksmith coal is about the same.

The pig-iron market is very quiet, with practically no sales, though shipments on previous orders are moving regularly, reducing the tonnage in yards. All manufactures are holding for $11.50 for the balance of this year on the basis of 2 foundry. Although shipments are off for this season, some of the railroads are still short of the necessary equipment to move coal satisfactorily, while others seem to be in fair shape.

NEW ORLEANS

Unseasonably warm weather in the South breaks the domestic market. Cargo movement to Latin America falls off decidedly. Texas points are buying coal.

Unusually warm weather during November reduced the domestic consumption of coal to practically nothing. This condition has resulted in considerable loss to retail yards as the costly delivery systems put on in October, were in idleness. Demand for bunker coal has been active while parcel shipments to Latin American countries continue in a volume nearly double that of this time last year. Unusual quiet prevails in the cargo trade; the second week has passed without the clearing of a single shipload of coal from any one of the Gulf ports.

Texas points are buying coal in larger quantities than usual at this time of the year. Practically all danger from car shortage has passed, it is believed, and the rail movement from the Alabama fields into New Orleans continues heavy.

INDIANAPOLIS

Mild weather continues and consumption reduced to a minimum, affecting mine operations, but not prices. The threatened teamsters' strike has boomed the retail trade. No change in retail prices.

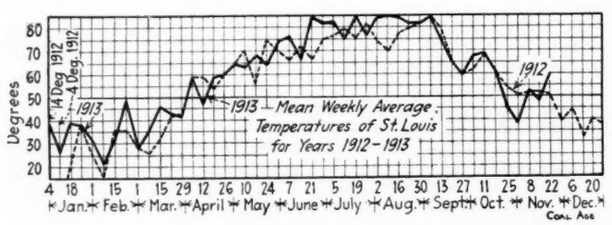
With weather so mild that the temperature ranges between 50 and 60 deg., the minimum amount of coal is being consumed by domestic users and business would be poor were it not for the buying caused by the threatened teamsters' strike. There was a rush on the retail yards that kept every wagon busy. Office buildings, mercantile establishments and apartment houses also took all the coal they had storage room for. The scope of the strike is not well developed, and it is not known how far it will reach. The consumers that can buy in larger quantities have been busy filling up their bins and will not need additional coal until after the New Year.

The yards are well stocked for this rush and still hold ample supplies, and the mines will not benefit proportionately. The car situation is fairly good, but the mild weather is against full operation. The demand for steam coal is fairly satisfactory, but these buyers are cautious. Coal operators say there is an undercurrent in industrial circles that seems to point to activity, if the currency bill were out of the way. Prices hold firm and there is no disposition at the mines to offer bargains, with the hope of stimulating selling. Rather than cut prices, the mines cut the running schedule. Good domestic lump still commands $1.90, f.o.b. mines. Steam grades hold unchanged.

ST. LOUIS, MO.

Market demoralized and no relief in sight. Warm weather has reduced the demand fully one half. Operation being much curtailed.

Continued warm weather has developed conditions that are worse than those that existed at any time last summer. The domestic demand for coal is practically nothing, and dealers who have contracts and have had to take coal on them, have large stocks scattered all over their property. The same thing applies to steam plants, and unless some exceptional winter weather comes along between now and January first, there will be no hope for better conditions until after the first of the year.



In the Carterville field some mines have shut down until the market permits them to operate at a profit; Carterville coal dropped off 35c. a ton in one week. Standard 2-in. coal is down to 90c. and screenings are selling at from 20 to 30 cents. Indications are that the steam market will get better, as the lessening production of lump will make steam sizes scarce. Many mines in the Standard field have suspended operations until they can at least make the cost of production.

The weather has also affected the demand for anthracite, smokeless and coke, and practically all of these fuels are moving in very slow, with no demand, and are being cut in price in order to save demurrage.

The prevailing market is:

	Carterville and Franklin Co	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$1.00*
3-in. lump	.....	.....	$1.40*	.....
6-in. lump	$1.30 @ 1.50	.....	1.50*	1.20*
Lump and egg	1.85 @ 2.15	.....	.....	.....
No. 1 nut	1.40 @ 1.60	.....	.....	.....
Screenings	0.40 @ 0.50	.....	.....	.....
Mine-run	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut	1.75	$2.25	1.40	.....
No. 2 washed nut	1.35	.....	1.60	.....
No. 3 washed nut	1.15	.....	.....	.....
No. 4 washed nut	1.05	.....	.....	.....
No. 5 washed nut	0.50	.....	.....	.....

*Asked price.

KANSAS CITY, MO.

Weather conditions materially restricting consumption and mines are curtailing operations. Manufacturing demand also light.

The coal business in Kansas City is sluggish, with demand at a low ebb because of the warm weather which has been a disquieting feature of the situation for some time past. Though mines are in the main working at full capacity, a few have closed to half time, and more will join this minority, unless there is an early change in weather conditions.

All lines are lagging, commercial demand being extremely quiet. The mines which hold railroad contracts are getting along fairly well, with this class of business. Others are finding little gratifying in the situation, and are keeping a sharp eye on the weather man. The market around Kansas City is demoralized and coal men are conceding a great deal in order to keep the product moving. The country market is holding up well, despite the warm weather.

OGDEN, UTAH

Owing to warm weather, market is quiet. Conditions in Colorado, Nebraska and Kansas not serious. Plenty of cars at Wyoming and Utah mines. Shortage of miners in Wyoming.

While the mines have been receiving sufficient orders to keep them running at full capacity, it has kept the various sales departments busy getting orders. It has been a number of years since the territory west of the Mississippi has enjoyed such a long warm fall. This condition has prevailed in all parts and little retail business has been done.

The territory adjoining the Colorado mines is fortunate in having had such warm weather during the strike in that state. There is an abundance of coal in Denver and the surrounding market and no indication of a shortage. This condition, of course, will change with a change in temperature.

The car supply at the Wyoming and Utah mines has been all the operators could ask for this year with a possible exception of a short period in the early fall at which time the Utah mines experienced a shortage of equipment. There is quite a shortage of miners at Rock Springs and it is estimated 1000 men could be put to work in and around the mines. The operators are anxious to get the mines filled up in order to meet the demand for coal which no doubt will shortly arrive.

Quotations for shipment to Colorado and Nebraska advanced on Nov. 10 and the market is now quotable as follows:

	California	Colo. & Neb.	General
Lump	$3.00@3.50	$3.25	$2.75
Nut	2.50@3.00	2.50	2.25
Mine-run	1.85	1.85	1.85
Slack	1.00	1.00	1.00

PORTLAND, ORE.

Canadian operators visit Portland, investigating possibilities for shipping coal via the Columbia River when the Celilo Canal is opened.

Officials of the West Canadian Colliers Co, have conferred with officials of the Portland Chamber of Commerce in regard to the probabilities of shipping coal from the Crow's Nest Pass by rail to the upper Columbia, thence by water through the Celilo Canal to Portland or other points on the river. The question not settled is whether or not coal can be shipped cheaper by the rail and water route than by the all-rail route by which the freight to Portland now is $4.25 a ton. The Celilo canal will be opened soon by the government, work having been under way for many years.

Market conditions here at present are unchanged, with no likelihood of any immediate fluctuation.

FOREIGN MARKETS

GREAT BRITAIN

Nov. 21—New business is difficult to arrange owing to continued scarcity of coal for prompt positions. Sellers are very firm in their ideas of price for forward loading and a fair amount of business is passing. Quotations are approximately:

Best Welsh steam	$4.86@5.04	Best Monmouthshires	$4.20@4.32
Best seconds	4.68@4.80	Seconds	3.96@4.02
Seconds	4.50@4.62	Best Cardiff smalls	2.58@2.64
Best dry coals	4.56@4.68	Seconds	2.34@2.46

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

British Exports—The following is a comparative statement of British exports for October and the first 10 months of the last three years, in long tons:

	October		10 Months		
	1912	1913	1911	1912	1913
Anthracite	278,321	281,443	1,984,480	2,048,811	2,470,934
Steam	4,989,452	4,952,643	38,831,231	37,799,653	44,708,116
Gas	1,017,126	1,026,497	8,672,664	8,772,149	9,610,209
Household	195,014	159,373	1,258,758	1,341,407	1,495,206
Other sorts	319,855	319,517	2,510,317	2,588,171	2,972,796
Total	6,799,768	6,739,473	53,257,450	52,550,191	61,257,261
Coke	122,298	150,955	837,891	803 011	989,010
Manufactured fuel	136,376	169,500	1,347,495	1,252,007	1,711,865
Grand total	7,058,442	7,059,928	55,442,836	54,605,209	63,958,139
Bunker coal	1,818,431	1,888,794	.....	15,020,522	17,434,411

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follows; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

Italy—A report from an American consular officer states that a business man in Italy desires to be placed in communication with American exporters of coal, with the object of representing one in that country as agent. The coal desired is that especially suited for steamships. Representation for all Italy is desired. Correspondence may be in English, and references will be furnished.—**No. 11,923.**

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for October and first ten months of this year and last year in short tons:

	October		Ten Months	
	1913	1912	1913	1912
Anthracite	1,046,703	970,880	8,711,723	8,358,717
Bituminous	4,887,840	4,113,550	42,662,163	38,227,609
Coke	1,152,950	1,211,620	12,012,363	10,882,963
Total	7,087,493	6,296,050	63,386,249	57,469,289

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for September, 1912-13, and for the nine months ending September, 1911-12-13, in long tons:

	9 Months			September	
Imports from:	1911	1912	1913	1912	1913
United Kingdom	6,212	4,062	4,597	222	904
Canada	751,050	1,050,394	828,013	133,941	81,984
Japan	9,271	20,228	79,075	1,612	8,846
Australia and Tasmania	161,423	108,925	121,386	24,371	24,735
Other countries	355	2,025	2,816	100	.....
Total	928,311	1,185,634	1,035,887	160,246	116,469
Exports:					
Anthracite	2,625,582	2,601,631	3,173,002	415,301	325,559
Bituminous,					
Canada	7,659,378	7,766,198	10,283,998	1,070,188	1,631,526
Panama	387,976	362,277	387,582	50,050	35,732
Mexico	401,936	239,402	397,753	14,841	20,655
Cuba	740,349	851,389	983,392	93,754	115,278
West Indies	416,212	506,624	464,645	26,214	45,149
Other countries	519,021	1,257,403	1,276,593	59,894	111,112
Total	10,124,872	10,983,293	13,793,963	1,314,941	1,959,452
Bunker coal	5,012,097	5,495,719	5,763,584	551,310	684,395

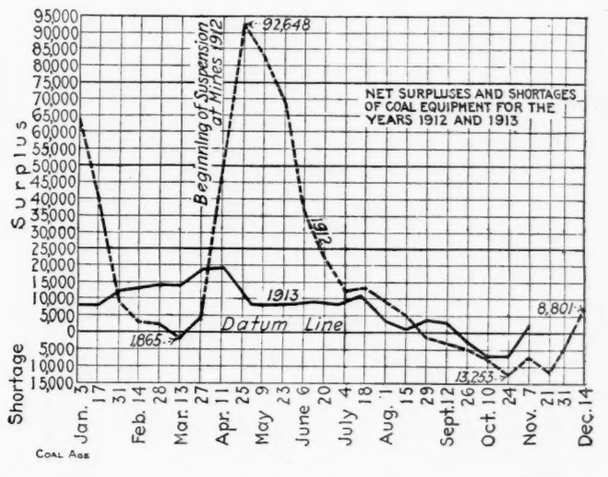
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Nov. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	14	15	1
N. Y.; New Jersey, Del.; Maryland; Eastern Penn	2,857	293	**2,564**
Ohio; Indiana; Michigan; Western Pennsylvania	328	1,704	1,376
West Virginia, Virginia, North & South Carolina	1,102	4,454	3,352
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	250	1,414	1,164
Iowa, Illinois, Wis., Minn.; North & South Dakota	1,300	64	**1,236**
Montana, Wyoming, Nebraska	359	20	**339**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	1,461	398	**1,063**
Texas, Louisiana, New Mexico	509	42	**467**
Oregon, Idaho, California, Arizona	2,340	73	**2,267**
Canadian Lines	0	0	0
Total	10,520	8,477	**2,043**

	July 15	Aug. 1	Aug. 15	Sept. 1	Sept. 15	Oct. 1	Oct. 15	Nov. 1
Surplus	13,203	8,810	8,293	8,689	8,714	7,953	6,014	6,720
Shortage	1,826	4,029	7,038	5,209	7,731	10,393	12,502	12,595
Net*	**12,377**	**4,781**	**1,255**	**3,480**	**983**	2,440	6,488	5,875

***Bold face** type indicates a surplus.



COAL FREIGHT DECISIONS

I. C. C. No. 5409—Am. Brake Shoe & Foundry Co. vs. Belt Ry. Co. of Chattanooga and Nashville, Chattanooga & St. Louis Ry.

Rule of carriers providing that where cars are switched to private scales for weighing a charge of 50c. per car would be made unless weights so ascertained were used for the assessment of freight charges not found to be unlawful.

Suspension Docket No. 217—Storage Charges in Central Freight Association Territory.

Proposed uniform storage rules and rates, filed by carriers in central freight association territory, found unreasonable in certan particulars, and in view of substantial increases permitted in storage charges on explosives and other dengerous articles, carriers required to notify consignors, in case request is properly made, of failure or refusal of consignees to remove shipments of such articles within the time prescribed.

Suspension Docket No. 251—New Mexico Coal Rates.

Proposed increases found to be result of dispute between carriers over divisions and not justified.—**Opinion No. 2440.**

I. C. C. No. 5281—Arizona Corporation Commission vs. Atchison, Topeka & Santa Fé Ry.

Rates for the transportation of coal in carloads from Gallup, N. Mex., to various points in Arizona found unreasonable. Reasonable maximum rates prescribed for the future.

I. C. C. No. 5425—National Coal Co. (Ohio) vs. Baltimore & Ohio R.R.

A carrier rated a coal mine and distributed cars to it strictly in accordance with established rules, fairly adopted after consultation with and approval by mine operators; **Held:**

That such carrier cannot be held guilty of undue discrimination against such mine on a showing that the shipper's commercial misfortunes in the months used, under the rules, to determine the rating of the mine, operated to reduce such rating. Complaint dismissed.

FINANCIAL DEPARTMENT

Lehigh Valley Coal Co.

Vice-president F. M. Chase reports for the year ended June 30, 1913, as follows:

Results—The total net income, after deducting interest and other charges, was $1,471,275, an increase of $309,033. This is not, however, a normal increase, owing to the suspension of mining during April and May, 1912, pending negotiations for a new agreement with employees. The production of anthracite coal from the lands owned and leased, including that mined by tenants, was 8,860,032 gross tons [against 8,224,217 tons in year 1911-12]. From the Snow Shoe lands, 350,105 gross tons of bituminous coal were mined, an increase 70,021 tons.

Additions and Betterments—These cost $312,211. The old breaker at Franklin Colliery is being replaced by a new fireproof breaker of considerably greater capacity. The work of modernizing the breaker, etc., at Park Colliery has been carried on, but without interfering much with regular operation. An electric haulage plant has been installed at Packer No. 4 colliery. A new washery is building to re-work the culm banks on the west end of the Delano lands.

Contracts—Complying with the decision of the U. S. Supreme Court in the Government suit against this and other anthracite mining companies, your company is no longer purchasing coal from other producers under 65% contracts or any similar arrangement, and has no interest in any mining operations other than those conducted by it on its own lands or by tenants who lease lands from the company.

Depreciation Due to Coal Mining—Acting with the advice of expert accountants, a charge is being made to income account, beginning with the present fiscal year, to measure the depreciation on the basis of coal mined, this charge being credited to a reserve account. Such additions and betterments as are made to the property are being charged to capital account and thus appear on the balance sheet. The accounts since Jan. 1, 1909, have been revised on this basis, as more fully appears below.

Financial—The "deferred real estate payments," representing short-term notes given for the acquisition of property in previous years, have been reduced by $292,500, and now amount to $800,000; $109,379 was paid to sinking funds. Current assets are $2,408,035 in excess of current liabilities.

PROFIT AND LOSS ACCOUNT FOR YEARS ENDING JUNE 30

	1912—13	1911—12	1910—11	1909—10
Total surp. beginning yr..	$3,486,637	$4,864,200	$3,393,443	$2,272,897
Net income for year.....	1,471,275	1,162,241	1,512,844	1,136,543
Imports Jan 1, 1909, to June 30, '12, originally deducted from income..	1,407,917	.....	.....	.....
Total.....	$6,365,829	$6,026,441	$4,906,287	$3,409,440
Deduct—				
Deprec'n of imports, Jan. 1, '09, to June 30, 1912.....	2,566,240	.....	.....	.....
Appr'ns for insur. fund...	50,000	.....	.....	.....
Miscell. adjustments...	35,349	10,924	42,087	15,998
Int. on ctfs. of indebt. accrued prior to June 30, 1911.....	.....	2,528,880	.....	.....
Total.....	$2,651,590	$2,539,804	$42,087	$15,998
Total surp. end year...	$3,714,239	$3,486,637	$4,864,200	$3,393,443

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Byproducts Coke Corporation

President R. G. Hazard in a circular issued the early part of the current year said as follows:

Our profit for the year 1912 is the largest in the company's history. The gain is due to higher price of coke and to an increase of 20% in output from the same number of ovens as in 1911. The 40 ovens mentioned in circular of February, 1912 were put into service on Dec. 28 and are now in full operation. During the year 628,000 tons of coke were produced in 200 ovens. The plant now has 240 ovens.

The circular of Aug. 15, 1912 announced the decision to add still another block of 40 ovens, and the remainder of our $2,00,000 bonds were offered to the stockholders and promptly taken at 102. Work is being pushed on the new block, and it is expected that it will be making coke about Aug. 1, 1914. This block will complete 280 ovens, which will coke 3600 tons of coal each day and give the plant an annual capacity of over 1,000,000 tons of coke.

Considerable equipment has been provided: A new fast plant to double the capacity of unloading coal from boats; an additional coal-storage bridge; increased coke-handling facilities; a large water-pumping station; additions to power plant and a new machine shop.

The demand for coke in the Chicago district continues considerably to exceed what we can furnish and the question of coal supply also requires careful study. Financial plans are under consideration. During the present year prices of coke have distinctly advanced, and the prospects are more encouraging than ever before.

INCOME ACCOUNT

	1912	1911	1910	1909
Total earns. from oper...	$790,526	$479,746	$479,793	$373,721
Premium on bonds.....	6,500	.....	.....	.....
Earns. from investments.	12,180	.....	.....	.....
Total earnings.....	$809,206	$479,746	$479,793	$373,721
Expenses and taxes.....	$51,452	$49,009	$80,818	$71,950
Bond, etc., interest.....	80,058	61,508		
Net earnings.....	$677,696	$369,229	$398,975	$301,771
Deduct—Deprec'n, etc....	$262,092	$186,151	$205,005	$129,668
Dividends.....	(8%) 240,000	(6) 180,000	(6) 180,000	(5½) 165,000
Balance for year.....	$175,604	sur. $3,078	sur. $13,970	sur. $7,103

BALANCE SHEET DEC. 31

Assets—	1912	1911	*Liabilities*—	1912	1911
Plant account...	$3,261,479	$2,575,637	Capital stock...	$3,000,000	$3,000,000
Real estate.....	467,871	479,201	Bonds.....	2,000,000	839,000
Invest's in other cos.....	353,444	353,444	Bills payable....	250,000	430,000
Sinking fund....	134,308	101,481	Accrued bond int.....	21,299	8,618
Cash.....	437,495	254,930	Wages.....	41,229	16,762
Material and supplies.....	862,485	451,921	Accident reserve	4,894	.....
Accounts receivable.....	360,663	281,172	Accts. payable..	177,687	38,680
Miscellaneous...	15,076	4,325	Undivided earns.	*397,714	169,052
			Total.....	$5,892,822	$4,502,112
Total.....	$5,892,822	$4,502,112			

* From the undivided earnings as shown above, $397,714, there was deducted a dividend of 3%, calling for $90,000, and also an extra dividend of 2%, calling for $60,000, both paid Feb. 1913 (which is included in deductions from income above), and $11,106 for bonus to employees, leaving a balance to be carried forward of $236,607.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Nov. 29:

Stocks	Week's Range High	Week's Range Low	Last	Year's Range High	Year's Range Low
American Coal Products.....	..	..	80	87	80
American Coal Products Pref.....	..	..	105	109½	102
Colorado Fuel & Iron.....	27⅛	27¼	27⅛	41¾	24½
Colorado Fuel & Iron Pref.....	....	....	155	155	150
Consolidation Coal of Maryland.....	....	....	102¼	102¼	102¼
Lehigh Valley Coal Sales.....	190	175	175	..	..
Island Creek Coal Com.....	47¼	45½	45½	53¼	47
Island Creek Coal Pref.....	83	81½	81½	85	80
Pittsburgh Coal.....	19⅛	19⅛	19⅛	24¾	14½
Pittsburgh Coal Pref.....	88⅛	87	87¼	95	73
Pond Creek.....	17⅛	17½	17⅛	23¾	16½
Reading.....	160¾	159	159¾	171	151¾
Reading 1st Pref.....	85¼	84½	84½	92½	82½
Reading 2nd Pref.....	..	..	84	95	84
Virginia Iron, Coal & Coke.....	40	40	40	54	37

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s.....	90	92	90	90	90	99½
Colo. F. & I. gen. 6s.....	104	106½	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu.....	77½	Sale	77½	78	77½	85
Cons. Ind. Coal Me. 1st 5s.....	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s.....	..	87	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s.....	..	..	102¾	April '06	..	..
K. & H. C. & C. 1st s f g 5s.....	91	..	91	Oct. '13	91	98
Pocah. Con. Coll. 1st s f 5s.....	..	87¾	86	Oct. '13	85	87¾
St. L. Rky. Mt. & Pac. 1st 5s.....	76	77¾	78	Oct. '13	73	80½
Tenn. Coal gen. 5s.....	97	97¾	97	97¾	97	103
Birm. Div. 1st consol. 6s.....	101	101½	101	Nov. '13	100¾	103
Tenn. Div. 1st g 6s.....	101	101¾	100¾	Oct. '13	99	102
Cah. C. M. Co. 1st g 6s.....	..	..	103	July '13	103	103
Utah Fuel 1st g 5s.....	..	..	..	.....	..	..
Victor Fuel 1st s f 5s.....	..	84	80	May '13	79¾	80
Va. I. Coal & Coke 1st g 5s.....	92½	93	92½	Nov. '13	92	98

No Important Dividends were announced during the week.

INDEX OF COAL LITERATURE

We will furnish copy of any article (if in print) for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

Coal-Mine Accidents in the United States and Foreign Countries. F. W. Horton. Bureau of Mines, Bull. 69; 86 pp., illus.

Mine Accidents and their Relation to Management. R. D. Brown. Coal Age, Nov. 22, 1913; 1½ pp. 10c.

Monthly Statement of Coal-Mine Fatalities in the United States, August, 1913; with Revised Figures for Preceding Months. Albert H. Fay. Bureau of Mines, 1913; 15 pp.

Rufford Colliery Accident. (Report by Mr. Walker, H. M. Inspector of Mines on the causes of and circumstances attending the accident at this colliery Feb. 7, 1913.) Coll. Guard., Oct. 17, 1913; 2¼ pp., illus. 40c.

BORING AND TUNNELING

Pneumatic and Electric Rotary Boring Machines. Iron Coal Tr. Rev., Nov. 14, 1913; ⅓ p., illus. 40c.

Safety in Tunneling. D. W. Brunton and J. A. Davis. Bureau of Mines, Miners' Circular 13; 14 pp.

COAL DUST

French Coal Dust Experiments at Commentry. (Report published by the Comite Central des Houilleres de France.) J. Taffanel. Coll. Guard., Oct. 31, 1912; 1¾ pp., illus. 40c.

Influence of Moisture Content on the Inflammability of Coal Dust. Coll. Guard., Nov. 7, 1913; ⅓ p. 40c.

The Danger of Coal Dust and its Preventive. Prof. Hummel. (Abstract of lecture before the colliery officials of the West Riding of Yorkshire.) Min. Eng., November, 1913; 2 pp. 40c.

The New Coal Dust Experiments. (Fifth report of the Explosions in Mines Committee.) Iron Coal Tr. Rev., Nov. 21, 1913; 4 pp. 40c.

COKE

Cost of a 50-Ton Coke-Oven Plant. Coal Age, Nov. 22, 1913; ¾ p. 10c.

Modern Byproduct Coking. (Paper by G. S. Cooper read before the Junior Inst. of Engrs.) Iron Coal Tr. Rev., Oct. 24, 1913; ⅝ p. 40c.

Reinforced Concrete on Coke Oven Plants. Gas Wld., Nov. 1, 1913; 1¼ pp., illus. 40c.

The Barugh Coke Ovens and Byproduct Plant. Gas Wld., Nov. 8, 1913; 2 pp., illus. 40c.

COMPRESSED AIR

Air Compressors and Compressed Air Machinery. Robt. L. Streeter. Eng. Mag., November, 1913; 16½ pp., illus. 35c.

Sullivan Angle-Compound Air Compressors. F. D. Holdsworth. Min. & Sci. Press, Nov. 15, 1913; 1½ pp., illus. 20c.

The Scott Air Compressor. (This is a multi-cylinder, single acting compressor using a ball type of air valve.) Iron Coal Tr. Rev., Oct. 24, 1913; 1 p., illus. 40c.

ELECTRICITY

Electrical Plant at the Aberpergwm Collieries. Iron Coal Tr. Rev., Nov. 7, 1913; 2¼ pp., illus. 40c.

Electrical Plant at the New Markham Pits. Iron Coal Tr. Rev., Oct. 31, 1913; 1¼ pp., illus. 40c.

Electrical Winding Gear at South Kenmuir Colliery. (Paper by W. M. Dunn, read before the Min. Inst. of Scotland, Oct. 11, 1913.) Coll. Guard., Oct. 17, 1913; ½ p., illus. 40c.

Hydro-Electric Power in Mexico. W. D. Hornaday. Min. & Eng. Wld., Nov. 1, 1913; 2½ pp., illus. 20c.

Electric Power from Fuel at Mines. Geo. E. Edwards. Min. & Eng. Wld., Nov. 15, 1913; 2¾ pp., illus. 20c.

Earthing and Bonding. B. King. Sci. & Art of Min., Nov. 22, 1913; 1¼ pp. 40c.

Machines for Continuous Current. C. A. Tupper. Coal Age, Nov. 15 and 22, 1913; 6¾ pp., illus. 20c.

Specifying and Buying Mining Electrical Plant. (Paper by J. P. C. Kivlen read before the West of Scotland branch of A. M. E. E.) Coll. Guard., Nov. 21, 1913; ⅓ p. 40c.

EXPLOSIONS

A Novel Firedamp Indicator. Coll. Guard., Nov. 7, 1913; 1¼ pp., illus. 40c.

Auckland Park Colliery Explosion. (Report of Inspectors Redmayne and Nicholson on the causes and circumstances attending the explosion at this mine on Oct. 27, 1912.) Iron Coal Tr. Rev., Oct. 24, 1913; 2¾ pp., illus. 40c.

Explosion at Acton No. 2 Mine, Alabama. Coal Age, Nov. 29, 1913; 2½ pp., illus. 10c.

Firedamp in Mines and the Prevention of Explosions. (Abstract of paper by Dr. John Harger read before the Manchester Geol. & Min. Soc.) Coll. Guard., Nov. 14, 1913; ¾ p. 40c.

Two Recent Coal-Mining Disasters. (Explosions at Senghenydd, Wales, and Dawson, New Mexico.) R. Dawson Hall. Coal Age, Nov. 15, 1913; 3½ pp., illus. 10c.

FUEL TESTING

Experiments on the Oxidation of Coal. (From Annales des Mines.) M. P. Mahler. Coll. Guard., Oct. 31, 1913; ¾ p. 40c.

Testing Coal and Determining Heating Values. Gas Wld., Nov. 22, 1913; ¼ p. 40c.

The Value of Coal Analyses. (Address on Fuels of the United States by the late Prof. N. W. Lord.) Coll. Engr., November, 1913; 2 pp. 40c.

GENERAL

Administration of Public Mining Lands. (Paper read by J F. Shafroth before the Amer. Min. Congress.) Coal Age, Nov. 1, 1913; 1¾ pp. 10c.

An Uptodate Mining Plant. (The Keystone C. & C. Co.'s new mine at Bovard, Penn., equipped with all modern devices.) Coal Tr. Jl., Nov. 12, 1913; 1½ pp., illus. 35c.

An Interesting Review of Coal Mining. (Address by Dr. R. T. Moore delivered before the Inst. of Engrs. & Shipbuilders in Scotland.) Coll. Guard., Nov. 21, 1913; 2¼ pp., illus. 40c.

Changing from Oil Fuel to Coal. F. W. Hetzel. Power, Dec. 2, 1913; 1½ pp., illus. 15c.

How to Protect Mines from Natural Gas-Well Leakages. (Address by Wm. Seddon to the Mine Foremen and Firebosses of the 17th Insp. Dist. of Penn.) Coal & Coke Op., Nov. 6, 1913; 1⅞ pp. 20c.

Indian Mining in 1912. (Abstract of report of Chief Inspector of Mines of India for 1912.) Iron Coal Tr. Rev., Oct. 24, 1913; ⅓ p. 40c.

Michigan Coal-Mining Interests in Spitzbergen. Eng. & Min. Jour., Nov. 29, 1913; ¾ p. 25c.

Powdered Coal as Fuel. (Presented by W. S. Quigley at recent convention of Amer. Foundrymen's Assn.) Ry. Age Gaz., Oct. 31, 1913; 1 p. 25c.

Purchasing Coal Under Specifications. (Abstract of paper by Geo. S. Pope, read before the Natl. Assn. of Cotton Mfrs. Oct. 2, 1913.) Power, Oct. 28, 1913; 2¼ pp. 15c.

Standardizing Mine Supplies and Work. Wm. J. Crocker. Min. & Eng. Wld., Nov. 22, 1913; 1½ pp. 20c.

The Training of Mine Managers. (Abstract of address of Sir Thomas H. Holland at meeting of Manchester Geol. & Min. Soc., Oct. 21, 1913.) Iron Coal Tr. Rev., Oct. 17, 1913; 1 p. 40c.

Where Anthracite and Bituminous Compete. Coal Tr. Jl., Nov., 12, 1913; ½ p. 35c.

The Bullcroft Main Colliery. (With supplement plate of the arrangement of the coal-washing plant, Luhrig system.) Iron Coal Tr. Rev., Oct. 17, 1913; 2⅜ pp., illus. 40c.

The Mine Surveyor. Alex. Richardson. (Address before the Chem. Metall. & Min. Soc. of So. Africa.) Can. Min. Jour., Nov. 15, 1913; 1¾ pp. 25c.

The Mineral Production of India. Coll. Guard., Nov. 14, 1913; 1¼ pp. 40c.

Utilizing the Nitrogen of Coal in the Form of Ammonia. (Communication from German Committee on Coking published in Glückauf). Iron Coal Tr. Rev., Oct. 31, 1913; ½ p. 40c.

GEOLOGY

The Cape Breton, Nova Scotia Coal Fields. Coal Age, Nov. 29, 1913; 2 pp. 10c.

Theory Regarding Process of Coal Formation. (Translated from Montanistische Rundschau.) Coal Age, Nov. 29, 1913; 1½ pp. 10c.

HOISTING AND HAULAGE

An Improved Type of Haulage Engine. (An ingenious valve arrangement enables the engine to be started, stopped and reversed through one vertical lever.) Iron Coal Tr. Rev., Oct. 31, 1913; ¾ p., illus. 40c.

Electric Winding Engines. Coll. Guard., Nov. 21, 1913; 1½ pp., illus. 40c.

Winding Appliances, Winding Ropes and Caples; Past and Present. (Paper by A. S. Bratley read before the Natl. Assn. of Colliery Mgrs.) Iron Coal Tr. Rev., Oct. 24, 1913; 1½ pp., illus. 40c.

LEGAL REFERENCES

Decision in Company House Eviction Cases. Coal & Coke Op., Oct. 30, 1913; ⅓ p. 20c.

Future Significance of the "Rate Case." Stanley B. Houck. Coal Dealer, November, 1913; 1 p. 20c.

New South Wales Mining Legislation. Min. & Eng. Rev., Sept. 5, 1913; 1 p. 40c.

Place for Delivery of Coal. A. L. H. Street. Coal Age, Nov. 8, 1913; 1 p. 10c.

Revision of the United States Mining Laws. (Letter written by Courtenay De Kalb.) Min. & Sci. Press, Nov. 15, 1913; 1½ pp. 20c.

Relation of Big Business to Mining. (Abstract of address delivered by Chas. R. Van Hise before the Amer. Min. Congress.) Coal Age, Nov. 8, 1913; 4¾ pp. 10c.

The Taxation of Coal Lands. (Address by R. V. Norris delivered before the Amer. Min. Congress.) Coal Age, Nov. 1, 1913; 2¼ pp. 10c.

The Assessment of Collieries. C. Kearton. Iron Coal Tr. Rev., Nov. 7, 1913; ⅝ p. 40c.

The New Income Tax. (Summary of those portions of the Income Tax Law relating to the payment of tax by mining corporations.) Eng. & Min. Journ., Nov. 1, 1913; 1¾ pp. 25c.

LIGHTING

A Defense of the Flame Safety Mine Lamp. Coal Age, Nov. 29, 1913; 2½ pp. 10c.

The Use and Care of Miners' Safety Lamps. Jas. W. Paul. Bureau of Mines, Miners' Circular 12; 12 pp., illus.

The Ability of the Acetylene Flame. E. M. Chance. Coll. Engr., November, 1913; 2 pp. 40c.

Use and Abuse of Acetylene Lamps in Mines. Claude T. Rice. Min. & Eng. Wld., Nov. 15, 1913; 1½ pp. 20c.

MINING COSTS

Coal-Mine Accounting Systems. (Address delivered by J. B. L. Hornblower before the Amer. Min. Congress.) Coal Age, Nov. 1, 1913; 2 pp. 10c.

The Costs and Profits in Coal Mining. (Address of E. W. Parker before the Amer. Min. Congress.) Coal Age, Nov. 1, 1913; 2¼ pp. 10c.

MINE FIRES

Packer No. 5 Mine Fire. Employees' Mag., October, 1913; 2 pp., illus.

Spontaneous Combustion of Coal. (Evidence of Messrs. Johnson and Henshaw before the Departmental Committee appointed to inquire into spontaneous combustion in coal mines.) Iron Coal Tr. Rev., Nov. 14, 1913; 1¾ pp. 40c.

The Detection of Gob Fires. (Abstract of paper read by Dr. John Harger before the Manchester Geol. & Min. Soc.) Coll. Guard., Nov. 14, 1913; ¾ p. 40c.

The Cadder Mine Disaster. (Official report of Sir Henry Cunynghame.) Iron Coal Tr. Rev., Nov. 14, 1913; ¾ p. 40c.

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A New Coal Washing Table. Coal Age, Nov. 15, 1913; 1 p., illus. 10c.

Coal Washing, Coke and Byproduct Plant at Baruch. Coll. Guard., Nov. 14, 1913; 4⅛ pp., illus. 40c.

RESCUE, SAFETY APPARATUS

Simplified Witkowitz Rescue Apparatus. (Translated from Montanistische Rundschau.) Coll. Guard., Nov. 14, 1913; ¼ p., illus. 40c.

The Use of Rescue Apparatus at Lodge Mill Colliery, Huddersfield, England. (Paper read by W. D. Lloyd before the Midland Inst. of Min., Civil & Mech. Engrs.) Iron Coal Tr. Rev., Nov. 7, 1913; ¾ p. 40c.

The Use of Smoke Helmets in Rescue Work. Iron Coal Tr. Rev., Nov. 14, 1913; ¼ p. 40c.

The Huskisson Emergency Self-Rescue Apparatus. Iron Coal Tr. Rev., Oct. 31, 1913; ½ p., illus. 40c.

The Use of Injectors on Breathing Apparatus. (Translated from Montanistische Rundschau). Coal Age, Nov. 22, 1913; 1½ pp., illus. 10c.

STEAM ENGINES AND BOILERS

Large Prime Movers and Boilers for Power Houses. (Paper read at joint meeting of Natl. Assn. of Colliery Managers and Assn. of Min. Elec. Engrs. on Oct. 18.) Iron Coal Tr. Rev., Oct. 31, 1913; 3¼ pp., illus. 40c.

The Usco Water Softening and Purifying Plant. Iron Coal Tr. Rev., Oct. 17, 1913; ⅝ p., illus. 40c.

SHAFTS, SHAFT SINKING

Coffering. Wm. Cummings. Min. Eng., November, 1913; 1 p., illus. 40c.

Shaft Sinking Under Difficulties. Chas. A. Hirschberg. Coal Age, Nov. 29, 1913; 1¼ pp., illus. 10c.

The Cementation Process for Sinking Shafts. Sydney F. Walker. Coll. Engr., November, 1913; 1½ pp. 40c.

TRANSPORTATION

A Chinese Coal Cableway. A. Gradenwitz. Coal Age, Nov. 8, 1913; 2 pp., illus. 10c.

A New Coaling Barge. Iron Coal Tr. Rev., Oct. 31, 1913; 1 p., illus. 40c.

Coal Shipping on the Northeast Coast of England. Iron Coal Tr. Rev., Nov. 14, 1913; 1¾ pp., illus. 40c.

Coal Unloading Machines. (The first application of the Hulett unloader to the problem of handling coal.) Marine Rev., November, 1913; 3⅝ pp., illus. 30c.

Expert Handling of Traffic Problems. G. D. Crain, Jr. Coal & Coke Op., Nov. 20, 1913; 1¼ pp. 20c.

New Type of Equipment on Eastern Coal Docks. Black Diamond, Nov. 22, 1913; ½ p., illus. 20c.

TIMBERING, PACKING, ETC.

Advantages of Oval over Circular Pipes for Hydraulic Gob Stowing. O. Putz. Iron Coal Tr. Rev., Nov. 7, 1913; 3 pp., illus. 40c.

VENTILATION

An Improved Anemometer. Coal Age, Nov. 1, 1913; ¾ p., illus. 10c.

Automatic Mine Door at Seneca Colliery, L. V. C. Co., Employees' Mag., October, 1913; 2 pp., illus.

Colliery Ventilating Fans—A Comparison. Iron Coal Tr. Rev., Oct. 24, 1913; ¼ p., illus. 40c.

Mine Humidification. Dwight Gerber. Coll. Engr., November, 1913; 3 pp., illus. 40c.

WORKING OF MINERALS

Coal Mining in British Columbia. (Extract from Annual Report of Minister of Mines, 1912.) Wm. Fleet Robertson. Can. Min. Jour., Nov. 1, 1913; 1½ pp. 25c.

Mining Two Coal Seams Under the Pacific Ocean. Earle Wm. Gage. Black Diamond, Oct. 25, 1913; 1 p., illus. 20c.

Mining Natural Coke and Coal in Virginia. John E. Ambrose. Coal Age, Nov. 8, 1913; 1¼ pp., illus. 10c.

New Jeffrey Mining Machine. (Describes adjustable turret coal cutter which is self-propelling and especially designed for seams which have partings of shale.) Coal Tr. Jl., Nov. 5, 1913; 1 p., illus. 35c.

Pillar-Drawing Methods in Fairmont Region. A. W. Hesse. Coal Age, Nov. 22, 1913; 1 p., illus. 10c.

Retreating Longwall Mining Methods. Samuel Dean. Coal Age, Nov. 15, 1913; 2½ pp., illus. 10c.

Recent Types of Coal Cutters. Min. & Eng. Wld., Nov. 8, 1913; 1¼ pp., illus. 20c.